Science WONDER Stories

June

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HUGO GERNSBACK Editor

A GERNSBACK PUBLICATION

NEW
SCIENCE NEWS
OF THE MONTH

Science Stories by
H.G.WELLS
DR. D.H.KELLER
STANTON A.COBLENTZ

If all the Radio sets I've "fooled" with in my time were piled on top of each other, they'd reach about half-way to Mars. The trouble with me was that I thought I knew so much about Radio that I really didn't know the first thing. I thought Radio was a plaything—that was all I could see in it for me.

I Thought Radio Was a Plaything

But Now My Eyes Are Opened, And I'm Making Over $100 a Week!

$50 a week! Man alive, just one year ago a salary that big would have been the height of my ambition.

Twelve months ago I was scrimping along on starvation wages, just barely making both ends meet. It was the same old story—a little job, a salary just as small as the job—while I myself had been dragging along in the rut so long I couldn't see over the sides.

If you'd told me a year ago that in twelve months' time I would be making $100 and more every week in the Radio business—whew! I know I'd have thought you were crazy. But that's the sort of money I'm pulling down right now—and in the future I expect even more. Why, only today—

But I'm getting ahead of my story. I was hard up a year ago because I was kidding myself, that's all—not because I had to be. I could have been holding then the same sort of job I'm holding now, if I'd only been wise to myself. If you've fooled around with Radio, but never thought of it as a serious business, maybe you're in just the same boat I was. If so, you'll want to read how my eyes were opened for me.

When broadcasting first became the rage, several years ago, I first began my dabbling with the new art of Radio. I was "nuts" about the subject, like many thousands of other fellows all over the country. And no wonder! There's a fascination—something that grabs hold of a fellow—about twirling a little knob and suddenly listening to a voice speaking a thousand miles away! Twirling it a little more and listening to the mysterious dots and dashes of steamers far at sea. Even today I get a thrill from this strange force. In those days, many times I stayed up almost the whole night trying for DX. Many times I missed supper because I couldn't be dragged away from the latest circuit I was trying out.

I never seemed to get very far with it, though. I used to read the Radio magazines and occasionally a Radio book, but I never understood the subject very clearly, and lots of things I didn't see through at all.

So, up to a year ago, I was just a dabbler—I thought Radio was a plaything. I never realized what an enormous, fast-growing industry Radio had come to be—employing thousands and thousands of trained men. I usually stayed home in the evenings after work, because I didn't make enough money to go out very much. And generally during the evening I'd tinker a little with Radio—a set of my own or some friend's. I even made a little spare change this way, which helped a lot, but I didn't know enough to go very far with such work.

And as for the idea that a splendid Radio job might be mine, if I made a little effort to prepare for it—such an idea never entered my mind. When a friend suggested it to me one year ago, I laughed at him.

"You're kidding me," I said.

"I'm not," he replied. "Take a look at this ad.

He pointed to a page ad in a magazine an advertisement I'd seen many times, but just passed up without thinking, never dreaming it applied to me. This time I read the ad carefully. It told of many big opportunities for trained men to succeed in the great new Radio field. With the advertisement was a coupon offering a big free book full of information. I sent the coupon in, and in a few days received a handsome 64-page book, printed in two colors, telling all about the opportunities in the Radio field, and how a man can prepare quickly and easily at home to take advantage of these opportunities. Well, it was a revelation to me. I read the book carefully, and when I finished it I made my decision.

What's happened in the twelve months since that day, as I've already told you, seems almost like a dream to me now. For ten of those twelve months, I've had a Radio business of my own. At first, of course, I started it as a little proposition on the side, under the guidance of the National Radio Institute, the outfit that gave me my Radio training. It wasn't long before I was getting so much to do in the Radio line that I quit my measly little clerical job and devoted my full time to my Radio business.

Since that time I've gone right on up, always under the watchful guidance of my friends at the National Radio Institute. They would have given me just as much help, too, if I had wanted to follow some other line of Radio besides building my own retail business—such as broadcasting, manufacturing, experimenting, sea operating, or any one of the score of lines they prepare you for. And to think that until that day I sent for their eye-opening book, I'd been wailing "I never had a chance!"

Now I'm making, as I told you before, over $100 a week and I know the future holds even more, for Radio is one of the most progressive, fastest-growing businesses in the world today. And it's work that I like—work a man can get interested in.

Here's a real tip. You may not be as bad off as I was. But think it over—are you satisfied? Are you making enough money, at work that you like? Would you sign a contract to stay where you are now for the next ten years—making the same money? If not, you'd better be doing something about it instead of drifting.

This new Radio game is a live-wire field of golden rewards. The work in any of the 20 different lines of Radio is fascinating, absorbing, well paid. The National Radio Institute—oldest and largest Radio home-study school in the world—will train you inexpensively in your own home to know Radio from A to Z and to increase your earnings in the Radio field.

Take another step right now—no matter what your plans are, no matter how much or how little you know about Radio—clip the coupon below and look their free book over. It is filled with interesting facts, figures, and photos, and the information it will give you is worth a few minutes of anybody's time. You will place yourself under no obligation—the book is free, and is gladly sent to anyone who wants to know about Radio. Just address J. E. Smith, President, National Radio Institute, Dept. 9SA1, Washington, D. C.

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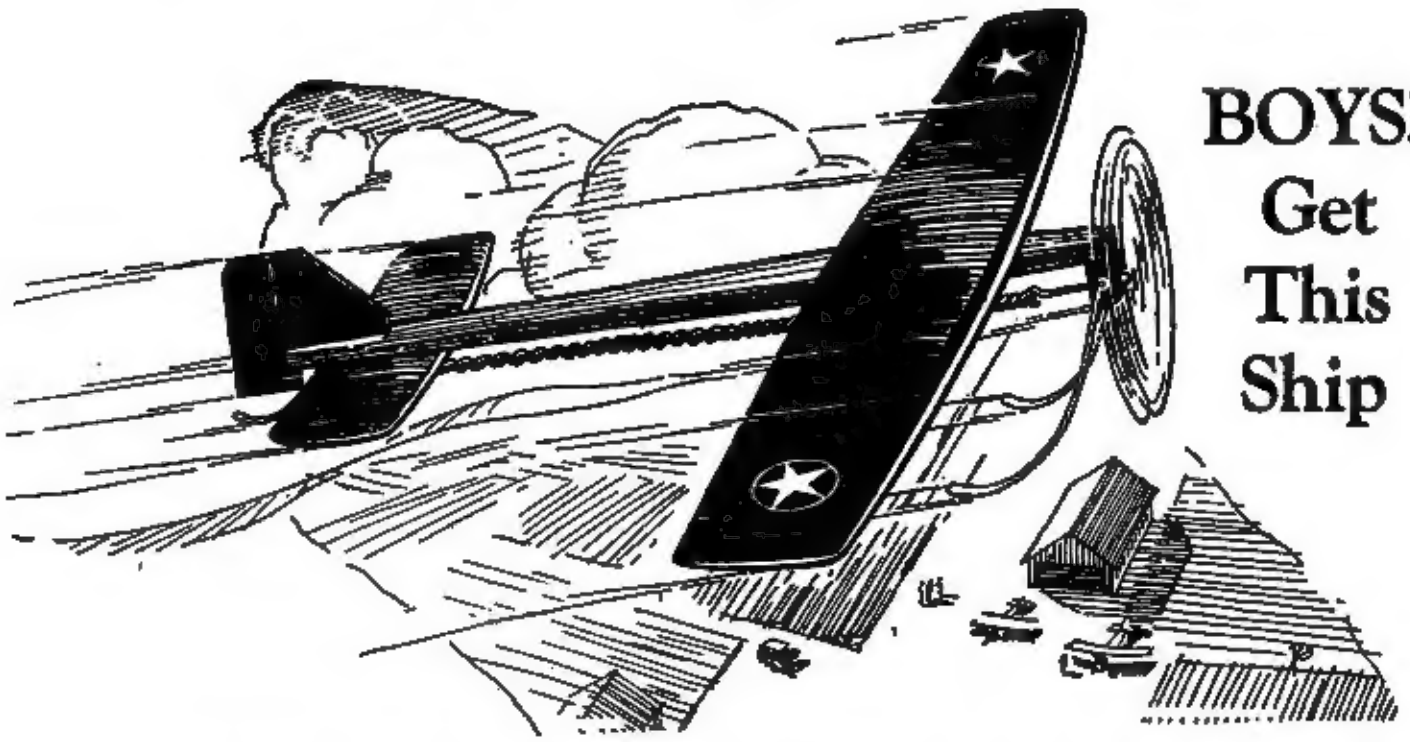

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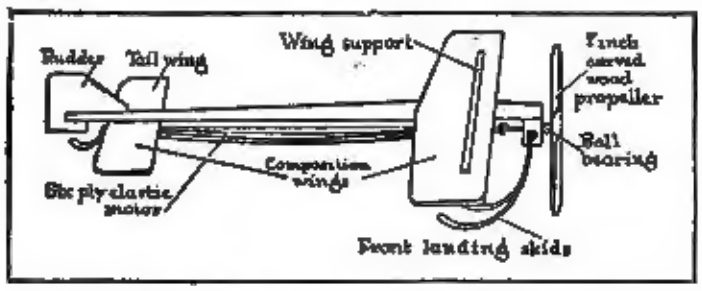

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ON THE COVER THIS MONTH

is illustrated WARRIORS OF SPACE. Artist Paul has shown vividly the night attack and destroying of the alien space flyer by our valiant terrestial defenders. In the distance, floating on the Pacific, is another defeated space flyer, while two more are hovering over the waters, soon to be rammed by the earth flyer.

NEXT MONTH

THE ALIEN INTELLIGENCE, by Jack Williamson. This story, by the well-known author, we are certain, will be the outstanding science fiction achievement of the year. Not since the Moon Pool, has there been a story to compare with it. It is chock-full of mystery and adventure and interwoven with a brand new use of natural forces, which in the end reveals itself as most plausible.

THE MENACE FROM BELOW, by Harl Vincent. Here is a corking story of the fourth dimension and atomic energy by a writer who certainly needs no introduction to science fiction lovers. It is really one of his best, and we are certain you will judge it in this manner. Besides the excellent science, it has enough of hair-raising situations to keep you thrilled until the last page.

THE PROBLEMS OF SPACE FLYING, by Capt. Hermann Noordung, A.D., M.E. Most of our readers, we are certain, are intensely interested in interplanetarian flying. We are starting in the next issue, the first part of one of the greatest articles of this kind that has yet appeared. A scientist discusses the different scientific problems of space flying. As an engineer, he has evolved the machinery by which it can be accomplished. This is not fiction, but a careful treatise written by an engineer. You will learn more about space flying than you ever thought was possible.

THE MOON BEASTS, by William P. Locke. A marvelous scientific exploration tale that cannot fail to keep your interest, and hold you in suspense until the end. Mr. Locke has advanced some new thoughts on lunar inhabitants, that for sheer daring and imagination are not easily matched in this type of story. Don't fail to read it.

AND OTHERS.

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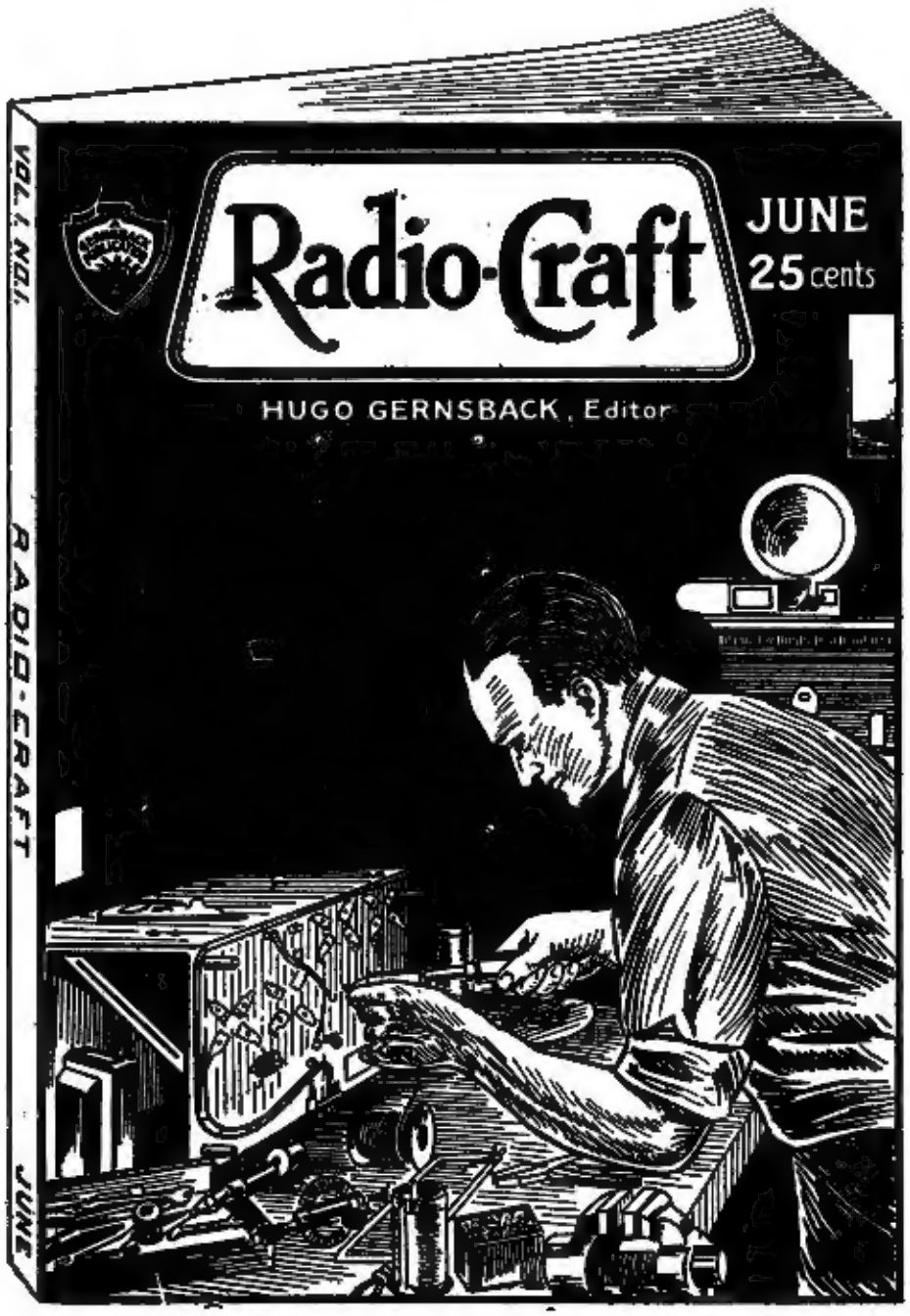

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VOLUME 1
No. 1

Science WONDER Stories

JUNE
1929

Prophetic Fiction is the Mother of Scientific Fact

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SCIENCE WONDER STORIES

By HUGO GERNSBACK

TASTE in reading matter changes with each generation. What was acceptable to your grandparents, was hopelessly out of style for your parents. The literature of your parents—the Laura Jean Libby type of story and the dime novels, Buffalo Bill and Deadwood Dick are laughed at by the present generation.

The past decade has seen the ascendancy of "sexy" literature, of the self confession type as well as the avalanche of modern detective stories.

But they are transient things, founded on the whims of the moment. For the world moves swiftly these days and with it moves literature also.

Science-Mechanics-the Technical Arts—they surround us on every hand, nay, enter deeply into our very lives. The telephone, radio, talking motion pictures, television, X-Rays, Radium, super-aircraft and dozens of others claim our constant attention. We live and breathe day by day in a Science saturated atmosphere.

The wonders of modern science no longer amaze us—we accept each new discovery as a matter of course. We even question why it had not come about sooner.

The man in the street no longer recognizes in science the word impossible; "What man wills, man can do," is his belief.

Interplanetarian trips, space flyers, talking to Mars, transplanting heads of humans, death-rays, gravity-nullifiers, transmutation of elements—why not? If not to-day, well, then, tomorrow. Are they surprises? Not to him; the modern man expects them.

No wonder, then, that anybody who has any imagination at all clamors for fiction of the Jules Verne and H. G. Wells type, made immortal by them; the story that has a scientific background, and is read by an ever growing multitude of intelligent people.

SCIENCE WONDER STORIES supplies this need for scientific fiction and supplies it better than any other magazine.

I started the movement of science fiction in America in 1908 through my first magazine, "MODERN ELECTRICS." At that time it was an experiment. Science fiction authors were scarce. There were not a dozen worth mentioning in the entire world.

I wrote a number of such stories and novels myself and gradually grouped about me a circle of authors who turned out better and better work as the years went by. I still have the best of these authors with me and practically all of them are writing and will continue to write for this magazine.

Who are the readers of SCIENCE WONDER STORIES? Everybody. Bankers, ministers, students, housewives, bricklayers, postal clerks, farmers, mechanics, dentists—every class you can think of—*but only those who have imagination.* And as a rule, only those with intelligence and curiosity.

When the idea of the new magazine first formulated itself, naturally the name was of importance, and *I put that into the hands of the future readers.* The publishers, had no hand in it.

Many thousands of prospective readers were circularized by means of a single letter. They were asked to subscribe to a new and unknown, as well as un-named magazine. The result was truly amazing. I never experienced the like in my twenty-five years of publishing experience.

And as the result of the popular vote, SCIENCE WONDER STORIES is the name of the new magazine. I asked for a vote, too, for the TYPE of story wanted most. And the type that carried the majority of votes I herewith pledge myself to publish.

The new readers voted for other things, too, notably for "Science News of the Month,"—a few pages of short paragraphs giving the latest scientific achievements of the entire world written in plain English, so that "he, who runs, may read and profit." That department begins in this issue.

Science fiction, as published in SCIENCE WONDER STORIES, is a tremendous new force in America. They are the stories that are discussed by inventors, by scientists, and in the classroom. Teachers insist that pupils read them, because they widen the young man's horizon, as nothing else can. Wise parents, too, let their children read this type of story, because they know that it keeps them abreast of the times, educates them and supplants the vicious and debasing sex story.

SCIENCE WONDER STORIES are clean, CLEAN from beginning to end. They stimulate only one thing—IMAGINATION. Where is the reader who can remain phlegmatic when you take him to distant planets, into the far flung future 10,000 years hence, or on a trip into the fourth dimension?

No wonder these readers or fans, if you please, look upon science fiction with a sort of reverence.

I consider it a particularly fortunate occasion to welcome to our editorial and advisory board, an imposing array of scientific authorities and educators.

It has long been my feeling that having an authority in the various sciences who would pass upon the scientific correctness of such stories, would be of the greatest aid in mapping the future course of science fiction.

There has been altogether too much pseudo-science fiction of a questionable quality in the past. Over-enthusiastic authors with little scientific training have rushed into print and unconsciously misled the reader by the distortion of scientific facts to achieve results that are clearly impossible.

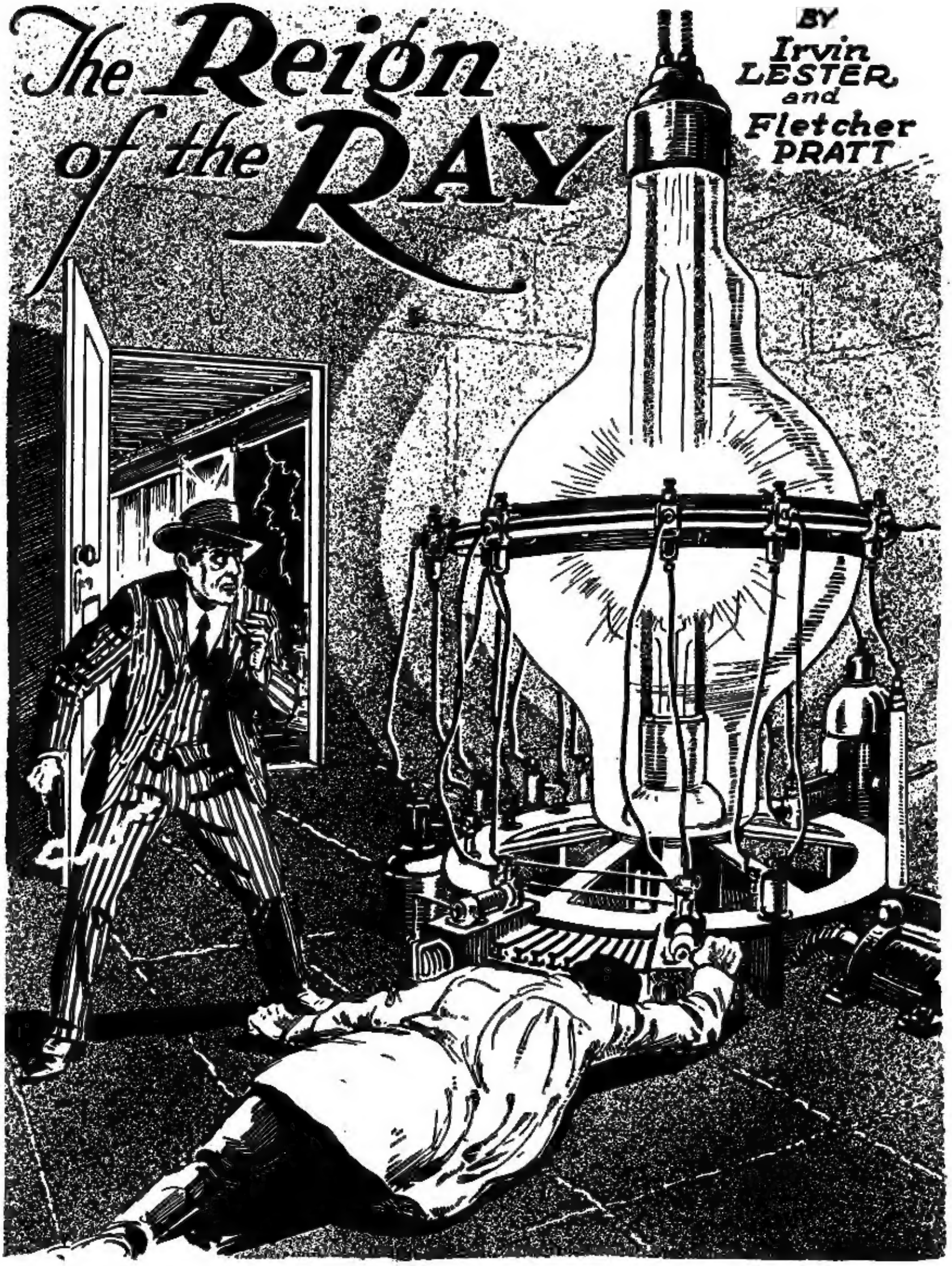
It is the policy of SCIENCE WONDER STORIES to publish only such stories that have their basis in scientific laws as we know them, or in the logical deduction of new laws from what we know. And that is the reason why ALL stories published in this magazine must pass muster before an authority. It is a guarantee to our readers that they will not get a false scientific education thru the perusal of these stories

I believe that this innovation will make new history in magazine publishing. I know of no other fiction magazine that can muster such an array of authorities and educators to pass upon the quality of its stories.

It augurs well for the future of science fiction in America.

The Reign of the RAY

BY Irvin LESTER and Fletcher PRATT



For a moment Schneider stood over him, a thin curl of smoke rising from the revolver still held in his hand. Then he became aware of a low humming sound and a violet glow thru the giant tube . . . a thunderstorm was gathering outside and the trees outlined black against a flash of lightning.

NOTE to reader or editor.

The "solution of the trisection of the angle" given here is, of course, a fallacy, as the problem cannot be solved. If, however, a precision instrument could be made to draw the lines as described in the story, it would be possible to prove mathematically that the solution was perfectly correct.

FLETCHER PRATT

The passages in code on the following pages are in a code invented by one of the writers. It won a prize offered for the most nearly indecipherable code, and a modification of it is in practical use. Having told, in a footnote, how to decipher it, we thought it would add to the interest of the reader of the story to work it out for himself.

I. L. & F. P.

A brief history of the great revolt and the Adams Ray that brought it about. Compiled from new sources, including original documents. Published at St. Louis, Mo., December, 2055.

PROLOG

A Word From the Editor

It is with some diffidence that we add another to the already numerous histories of the events following the discovery of the Adams Ray. The only reason we do so at all is that to our mind the story of the discovery has never been properly told. It was an event of world-shaking importance, and in time it did shake the world to very good purpose. But when the world first became aware of it, it was though a chain of exterior events, and the connection of the Adams Ray with these events was not seen at the time. Thus practically all the histories, even the most scholarly that touch the period treat the Adams Ray and its discovery as a happily fortituous event, a chance discovery coming in the midst of the great War of the Northern Alliance. It possessed a distinct influence on the course and termination of that conflict. The Wagstaff is treated in the same way; as though both were inventions like the paravane and the tank, born of the War of 1914.

The Wagstaff to a certain extent, really merits this description. The Adams Ray merits it not at all. In reality it was not only the proximate cause of the war, but the determinant of the whole of subsequent history. The war might have taken place in any case; but the time at which it broke out, the course it took, and the leading events in it, were all fixed by the Ray.

IRVIN LESTER

For this reason we have adopted the course, unusual in writing a general history, of dealing in great detail with events that seem comparatively small. Granted that this has disadvantages. It makes what is intended to be a serious history seem more like a novel, and it causes a break in the middle of our story. But the last part of the story has already been told, and only a sketchy narrative of the events is needed by a generation that already has most of them by heart. The discriminating historian can do no more than bring the facts into their proper relation and draw the philosophical inferences from them.

The first part of the story—the more detailed part—has never been told at all as a connected whole. This is, in fact, our main excuse for writing this history. The recent publication of the memoirs of Walker Adsill, former chief of the United States Secret Service, threw a flood of light into many of the dark corners of the early history of the Adams Ray. These memoirs set up a search for further documents, and the writer has fortunately been placed in possession of those found in the Soviet archives after the fall of Tula. With the aid of these, we have attempted to outline the events revolving about the discovery of the Adams Ray in something the manner they occurred. If we have done it in a way that at times seems fanciful, it is because we believe that we have in this way given a more faithful picture of the actual happenings than could be had from any ordinary historical narrative.

The story of the beginning is well-documented. For the life of Robert C. Adams, we have the records of the Rensselaer Polytechnic Institute and the memories of all those who had any contact with

OUR well-known authors have quite excelled themselves in the present masterpiece of science fiction. Stories of death dealing and super-natural rays are a novelty no longer in this type of literature.

In this story, however, the authors have quite outdone themselves in creating a situation that is at once novel and exceedingly ingenious and startling. It again goes to prove that if you make a terrible enough weapon, it will create conditions of existence that cannot be foreseen by the most astute war makers. Incidentally, the authors have injected quite a bit of excellent new science into this story, that we know will cause a great deal of discussion by our readers.

him and who, after he became famous, brought forth their mites of information to add to the general fund. Epstein's letter and Adsill's conference with him come, of course, from the memoirs of the Secret Service chief. Operative C117's report is from the Soviet archives and Adams' diary, with its mysterious code message, was found in a Munich bookshop by a German professor of mathematics who was interested in cryptograms. He bought it on catching a chance glimpse of the strings of numbers which indicated material for his hobby. It was badly torn and some parts were missing when it was discovered.

PART I

CHAPTER I

The Story of Bob Adams

(Time: 1900—July 10, 1926)

JERRY ADAMS' boy had learned loneliness early. An orphan with money is placed in a truly pitiable position; and to Bob Adams it quite soon appeared that people were cultivating his acquaintance for what they could get out of it. Deprived of all resources but those of his own making, and made the butt of cruel boyish jokes by reason of the suspicion with which he found it necessary to surround himself, he never made any friends of his own age.

As with all those who are thus thrown in upon themselves, Bob Adams lacked a sense of proportion. When he formed his one and only true friendship—with the teacher of mathematics at the orphan school to which he had been consigned by relatives anxious to be rid of responsibility—his keen young mind became completely absorbed in the ideas and contacts presented by the mathematician. He took more interest in geometry than in baseball, an unhealthy condition in so young a lad, and it was indeed through this very absorption in mathematics that he came to part with his one friend.

It was one night during Bob Adams' final year at school, just before he was due to go up to college. The professor of mathematics had been in bed for some time when he was aroused by a thunderous knocking and opened the door to find young Adams, all radiant with an idea.

"I've found how to trisect the angle," he declared.

"Indeed," said the professor. "Well, tell me about it in the morning. This is hardly the time ——".

"But look. It won't take a minute. Let me show you," and producing a pencil and a piece of paper from his pocket, the boy proceeded to explain.

Perhaps the mathematician's temper was none of the best at being forced to stand in pajamas and listen to a problem in geometry. "But that's silly," he said. "You young idiot, don't you know that trisecting the angle is the same as squaring the circle which is the same thing as finding the value of pi, on which mathematicians have worked for centuries? Your solution is a fallacy."

"But where's the fallacy?" asked Bob Adams, a trifle irritated, and anxious to prove that he was right.

"Never mind, take my word for it that there is one. I'll explain it in the morning." He yawned. "Good night."

Bob Adams found himself facing a closed door. It was perhaps natural that having his great discovery treated in this fashion by the very person from whom he had counted on for help and encouragement, should drive him into an unreasoning rage. With the anger still hot in him, he strode down the road to the station, took a night train to New York and enlisted in the army by adding two years to his age.

He was rescued and packed off to Rensselaer Poly, where he led a solitary existence for six years. When he returned to Mt. Hope, where he had been born, he had little more knowledge of men and culture than when he left, but he had a formidable section of the alphabet after his name in the form of engineering degrees. And on the strength of his graduate work, was already regarded as one of the more promising electrical engineers of the country.

Of this Bob Adams knew little and cared nothing. The rebuff his maiden discovery had received made him sensitive to hostile criticism and he studiously avoided it by not telling anybody what he was doing or had done. Back in the New Jersey village he turned a barn into a laboratory and began to do research work with the sublime indifference to the outside world that characterizes the true searcher after knowledge.

His neighbors regarded the whole business with the same spirit medieval peasants might have looked on the operations of an alchemist. "The Bughouse" was what they called Bob Adams' barn. And the experimenter himself was referred to as a "nut but a dam' bright feller," with that curious mixture of pride and contempt which outstanding ability always rouses in those whose lives are modeled on that of an eight-day clock.

In time the townsfolk became used to the queer, silent young man, classifying him as a natural oddity along with Martin Haney, who was a hundred years old. Both were pointed out to summer boarders as sights of the town.

Matters stood thus in 1926, in the spring of which year there was an unusual number of summer boarders, coming unusually early. The Jersey House and most of the lake cottages were crowded by the end of May. Among the boarders might have been noted a young man from New York with a Jewish cast of countenance who was not at all a normal specimen of the class to which he belonged. The local dances held no interest for him; he did not seem to care for girls or boating or fishing. All to him were less than the dust. His actions, in brief, bore out his claim that he was there just for a rest.

It was perhaps a coincidence that, returning from a walk on the Rockaway road one night, he should fall into step with Bob Adams during one of the latter's infrequent journeys to the village for some small necessity. The young scientist, after a glance and a civil "Good evening" pegged along in a silence. The stranger, having nodded a reply to the other's greeting, seemed well-pleased to preserve it.

They were passing the last houses of the village when Adams broke the silence with "Down for the summer?"

"No. Just came down for a rest. Too much study."

From such little seeds do great things grow. There was no further conversation that evening, but at another meeting (also by chance, curiously enough) a couple of nights later, the two discovered a common interest in the electrical phenomena connected with vacuum tubes and in a mutual desire for solitude. The New Yorker, who introduced himself as Schneider, a student electrical engineer, gained as hearty an approval as Bob Adams ever gave any human, and was ultimately invited to the laboratory.

He found the big barn had been cut off by a partition about a third of the way from the end. The smaller section was closed with a locked door, Adams explaining that he was conducting an experiment of some delicacy within. But the larger room, filled with electrical apparatus was a treasure house to the visitor. He examined things with interest and intelligence and offered suggestions that Adams found genuinely helpful.

The latter thought he had never met so entirely congenial a character. The friendship grew with rapidity and June and part of July were gone without the young experimenter realizing that Schneider was staying somewhat beyond the time when he might have been expected to return to the city.

It was on the afternoon of the tenth of the latter month that they sat together in the outer room discussing the Coolidge tube and its possibilities. "It might, someday," said Adams, "even lead to the release of the interatomic energy for which the chemists have been looking."

"But even if it did," protested Schneider, "might it not be more of a curse than a blessing? Russell* thinks that if the process of releasing atomic energy were once started it couldn't be stopped, and that it would run through the whole world like a fire, reducing everything to vibrating ions. Besides, look at the amount of current it takes to produce the changes brought about by the Coolidge tube. It would hardly be economic as a regular thing."

"That doesn't follow," said Adams. "Coolidge got one set of results with a vacuum tube constructed in a certain way. If a different type of tube were used, you might get different results altogether. He certainly made atomic changes of some sort with his tubes and if——" But then he broke off and glanced keenly at Schneider. "Can you keep a secret?"

As the other nodded, he rose, and leading the way to the locked portion of the laboratory, opened it with some effort (the door seemed extraordinarily heavy) and pressed a switch.

Adams' Secret

IN the glare of the two or three large electric light bulbs set in the ceiling, Schneider saw a windowless room about ten feet by fifteen, the entire center of which was occupied by a huge vacuum tube, all of ten feet tall. It swelled out to a sphere at the center and at its widest point seemed to be covered with some metal. A wheeled rack held it upright, and a maze of heavy electrical cables ran from it to connections in the wall. The room itself was perfectly bare save for two sheets of metal that were leaned against one side, and which also lined the walls, floor and ceiling. Schneider eyed this curiously.

"Lead insulation," said Adams, following his glance. "What you see here is probably the largest vacuum tube ever built. It is the Coolidge type with modifications. I've killed a rabbit in two seconds with its emanations and set up such violent atomic disturbance in gasoline as to cause it to explode in a closed dish. Lord alone knows what else it will do. I haven't given it a thorough trial yet."

Schneider's eyes bulged. "Why you might be able to set off explosives at a distance with it!" he exclaimed. "Such a thing would be worth millions to any country."

"I suppose so," said Adams, "but I don't care to sell it at present. It's still purely experimental."

"I have a friend—that is, I know somebody—I think I could make arrangements," stammered Schneider, "if you will let tests be made on it I think I could get you a fair price——."

"But I don't want to sell it," said Bob, his suspicious flaring up on the instant, "I have money enough."

"But you must sell it," cried Schneider, in uncontrollable excitement, "I tell you such a thing—my people will——"

"Your people! Say, boy, who are your people? What are you talking about, anyway? I tell you I won't sell it, and the United States of America are the only people who will get it. I might have known there'd be a catch in it somewhere when you started hanging around. Come on, get out of here now, and trot back home!" He stepped menacingly forward.

"Oh, yes you will sell it, Mr. Robert Adams," said Schneider, his eyes suddenly grown hard as he backed away. "You'll sell it or I'll take it," and Bob Adams was looking into the round steel ring of a revolver mouth. "Quick, now, how is it made?"

For answer the young scientist dived forward and down, striking up at the revolver with his

* He evidently meant Bertrand Russell, the famous English pessimist and scientific philosopher of that day—Editor's Note.

outstretched hand. There was a sharp report, a flash of flame, and Bob Adams went down heavily, striking some apparatus at the base of the giant tube with his head.

For a moment Schneider stood over him, a thin blue curl of smoke rising from the revolver still held in his hand. Then he became aware of a low humming sound and a violet glow from the giant tube. He glanced through the open door. The afternoon had grown dark as night; a thunderstorm was gathering outside, and for an instant he saw the trees along the road bending to the tempest, outlined black against a flash of lightning.

Then a great fountain of fire, far in the distance, rushed up toward the skies and flaring brighter than the lightning rushing down. A roar like the crash of a falling mountain drowned the thunder. The ground trembled; the windows in the outer room burst in a rain of glass; a scream rose somewhere in the village of Mt. Hope, and Schneider slid gently to the floor beside Bob Adams, his revolver denting the soft lead insulation as he fell.

CHAPTER II

Three Men Meet in Washington

(Time—September, 1926)

"THE position is this, Mr. Epstein," the oldest of the three was saying. "Admiral Downs is not, and has not been, satisfied that the explosion of the Lake Denmark arsenal was caused by lightning. The papers so reported it and we let them do it because we wished to carry on our line of investigation quietly."

"Wy shouldn't you teenk it's by the lightning the explosion?" asked Epstein without removing the cigar from his face.

The man in uniform looked at the older man and receiving a nod, turned to the Jew. "Because we had taken the utmost precautions against that very thing," he said. "The magazines were in different places, and largely underground. They were not very subject to ignition from one another. And the testimony, of the only two eyewitnesses we have, agrees on one thing—that two or three magazines went up at the same time. A lightning stroke might set one off, but that three lightning strokes should explode three different magazines at the same moment is almost unthinkable. That is why we called in Mr. Adsill."

The older man took up the tale again. "Other operatives in the department have been combing the locality for some time in search of anything that would give us a start. I tell you this to show you what we are up against. Of course an immense amount of confusion resulted from the explosion in all the surrounding towns, and Lake Denmark itself was bare of any indications of an incendiary origin for the affair. But at Mt. Hope, a few miles to the northwest, we found something that was promising.

"It appears that a young chap named Bob Adams had been conducting electrical experiments with vacuum tubes there. The War Department reports that he had been experimenting with a ray to stop aeroplanes or something of that sort. He had notified them of some success in the work and asked that they send a man down. They gave it little attention, they are always getting such reports from inventors, but our investigations show that Adams had a high reputation as an electrical engineer and experimenter.

"We found he had been missing from his place since the day of the explosion. Now Mt. Hope was one of the towns that was heavily shelled; he may easily have lost his life in the explosion. But the barn he had converted into a laboratory was intact except for some broken glass. And the rather curious fact was that all the electrical fuses were blown out.

"At one end of the barn was a room lined throughout with lead and fitted with electrical connections of unusual size, but otherwise perfectly vacant. Adams' electric meter, which had been read the day before, shows that he had used an immense amount of current that day; nearly two hundred kilowatt hours.

"There was nothing to connect this with the explosion beyond the fact that he was experimenting with rays. But we followed up the clue in the village, where a number of the summer boarders have not been accounted for, and searched the rooms that had been occupied by those who were missing. In one of them, which had been occupied by a chap named Schneider, we found this:"

He laid a piece of cardboard before the man he had addressed as Mr. Epstein. On it were pasted a number of small pieces of paper with several gaps. Something had been written on these with a typewriter:

"RGUBJ JR QUKK DJPE NW Y (here came a break) YID AIIB (a break) EOYJ REYXJ EOAA BIR JRDOYSYR RI (break) RI IAAE."

"Mmm. And what should it mean by me? I can't read Greek yet," said Mr. Epstein.

"We have had the code experts working on it." said the older man. "They find it fairly simple. It is made by striking not the correct letter on the typewriter, but in alternate words the one before the correct letter and the one after it. Here is the solution they give for it:"

"Think he will sho me," it read, "t- . . . tus soon . . . with truck. Will not hesitate to . . . to USSR."

"Wot's dees?" inquired Mr. Epstein. "t-u-s. Maybe it should be appartus, nu admiral? Saftig!" He beamed at the admiral, who winced.

"It is very suggestive, Mr. Epstein," said the older man. "Especially in view of the fact that a grocer in Mt. Hope reports that his two-ton delivery truck has been missing since the explosion. It might have been taken by someone anxious to get away—but then, it might not. At all events the USSR with which this message closes are the

initials of the Soviet Republic. Now it may be a wild goose chase, and we can't give you anything more definite to work on than just this; but we want you to go to Moscow and find out what you can about the discovery of a new ray that will set off explosives. If such a thing is in the hands of the Communists, it is a matter of extreme importance not only to this country but to the whole world, for an army provided with such a ray would be absolutely invincible. In fact, Mr. Epstein we are facing a national crisis, and we are depending upon you."

"I should gradually become a Bolsheviki, hah," said Mr. Epstein rolling his cigar in his mouth. "Is that all you can tell me yet?"

"I am sorry to say that it is."

"Hmmm. How much expenses do I get if I go there? Alretty the department is owing me money with income taxes."

"All you need. I tell you this is a national emergency."

"Hmm. And then somebody in this department says, 'This voucher is not complete.' Loafer! 'Where is the receipt you're getting by the hat-boy you tipped?'"

"I'll see that you get ample funds. You are to leave tonight."

"Yi, yi. To oblige a frent I'll do it. Business is business!" He rose and leaned across the table to the man in uniform. "Pleased to meet you, Mr. Admiral. Next time you're in New York when I get back call me up, huh?" and putting on a flat derby hat, he swaggered out.

The man in uniform looked at the older man and elevated his eyebrows. "Do you think——? One can't be too careful in an affair of this importance ——" he began.

"The best man in the department for the job," answered the other incisively. "With that impudent Jewish salesman's manner of his he can go anywhere and find out anything. Nobody suspects him because he is too obvious to suspect. And let me tell you he has a keen mind behind the funny exterior. He could repeat every word that has been said here, just as it was uttered."

"Well, I hope you're right," said the man in uniform, gathering up a handful of papers. "On the surface he is certainly not prepossessing, and candidly, I fear we are facing something very serious."

CHAPTER III

Report of Secret Operative C117

(Time—June-October, 1926)

TO THE High Commissars of the Eschgan, Comrades Stensoff, Voyonovich and Zaninin: Report on operations in the State of New Jersey, America, as ordered:

1. I was assigned to investigate possibilities with regard to high explosive ray reported as being developed by Robert C. Adams, American electrical engineer, at Mt. Hope, State of New Jersey.

2. Operatives E32, C212 and C96 were assigned to my orders.

3. Operative E32 was assigned to make contact and technical examination.

Operative E32 took a room at Mt. Hope as a summer boarder, giving his name as Schneider and his profession as electrical engineer. Reports were transmitted by his typing them and leaving them in upper drawer of his dresser for inspection when he was out, or on prearranged place under stone at edge of lake.

On June 1, Operative E32 reported preliminary contact with Robert C. Adams. On June 4, he reported second contact, adding that Adams was an extremely suspicious and self-centered nature and would be difficult subject, requiring much time.

I addressed reproof to him, emphasizing the need of haste as Adams might complete his device so far as to give public demonstration or otherwise succeed in persuading American army officials to give it attention. On June 14 he reported that Adams would certainly never give public demonstration and abhorred publicity of all kinds.

On June 18, he reported that Adams was evidently making progress with ray device, spending much time on it. Report also stated that it was probably in the nature of a vacuum tube of some type. On June 20, report stated that device was kept in separate section of Adams' laboratory, a large barn, refitted for the purpose, and that Adams always kept door locked.

On June 24 report stated that Adams was bitter over failure of the War Department of his government to give any attention to his invention; and that device might be purchased. I urged Operative E32 to obtain some knowledge of construction and possibilities of device.

On July 8 report stated that E32 thought Adams would show him device in a few days. Report requested that I have large truck prepared for emergencies as device was evidently large. Report also requested that I be prepared to burglarize laboratory if necessary. I accordingly instructed Operatives C212 and C96 to arrive in Mt. Hope on July 11.

On July 10 there was a heavy thunderstorm in early evening. Thinking the opportunity good, I approached the Adams laboratory to reconnoitre. While so engaged, I thought I heard a shot within, but not being certain did not dare to approach, as Operative E32 and Adams had been seen to enter.

A few minutes later there was a terrific explosion to the south and east where a large American government arsenal is located, not far away. The explosion was so violent that some houses were demolished down; and it was followed by further explosions in the same direction. Have since learned that the entire arsenal blew up, one magazine after another. Shells and rockets began to fall in the village. Meanwhile there was no sound within the laboratory, and after waiting a short

time I entered by the front door, which stood open.

I found a large number of laboratory appliances in an outer room, many of them broken by the shock of the explosion. There was an inner room at the back, with its door open.

I entered and found Operative E32 lying on the floor together with Adams. Adams was bleeding from a bullet wound in the body and was unconscious. Operative E32 was dead from unascertained cause. His revolver lay on the floor beside him and there were small burns on his forehead. Both men lay at the foot of a large glass tube passing through a metallic sphere. Tube was about ten feet long and had heavy electrical connections at each end. There was a switch set at base of tube on the floor and turned on. I found all electrical fuses in the building burned out when I tried to turn on a light.

The explosion of the arsenal was still continuing and the village was in great confusion when I returned there. People were leaving or attempting to leave by all roads. Several dead lay in the streets. I possessed myself of a small covered truck and returned to the laboratory with it.

Within the truck I placed bodies of Operative E32 and Adams, and after some effort, unscrewed connections of the tube, which I took to be the device on which Adams had been working; and got it also into the truck.

At the back end of the truck, I placed several chairs I found in the outer room (to allay suspicion) and drove away. At the west end of the village I found a broken-down passenger car and changed license plates with it. Then I drove west from that point and by country roads to Easton, State of Pennsylvania, arriving in early morning.

At once summoned Operative C212 by long distance telephone from New York, concealing Adams in small patch of woods near town together with truck.

Operative C212 arrived next morning with closed car, in which we confined Adams after tying him securely and attending his injury. The tube found in the laboratory was packed in a large case secured from a store in Easton, labelled "Musical Instruments" and shipped to Operative C212's address in New York.

We returned to New York in the car, as Adams continued to make violent threats, and we judged it unsafe to take him on the railroad.

At New York, operative C212 bought a large piano which was brought to his address. Export manifest was prepared for it, the address to which it was to be shipped being given as that of Norwegian agent (Operative A145) at Oslo. We made special request on the customs house to examine it at shipping address as on account of the delicacy of the instrument it might be broken by opening it either at the New York pier or at destination. Inspector called and was shown the piano. The large tube from Adams' laboratory was packed in its case and shipped in its place, instructions being forwarded to Operative A145 by cable. This instrument should now be in your hands.

Fearing that the device would be useless without some explanation of its operation, and being certain that only Adams could give this, he has been sent forward to you, under charge of Operative C212 on the tramp steamer "Creole" to London, from which point he will be forwarded by the usual channels.

I am certain that the explosion was caused by the operation of the tube, the same probably causing the death of Operative E32 also (Comrade Chanin) for whom I recommend posthumous honors and a decoration. The device cannot but be of the uttermost importance to our country and to the Social Revolution. Evidently, however, considerable dangers attend its use, and Adams alone can explain these. I recommend that every effort be made to play on his vanity, as the reports of Operative E32 indicate that he is an extremely difficult subject and this is the only method that offers success.

In further connection with Adams I cannot too highly emphasize the importance of the diary found in his pocket when he was searched at Easton, State of Pennsylvania, following my arrival there. This diary is transmitted herewith. It will be noted that some passages of it are in cipher, but efforts at this office have hitherto failed to resolve this cipher. We are retaining a copy of the diary in hopes that it will give us something to work on here.

There is little danger of the American government following up the matter, as it is openly reported by officials connected with the government that the explosion was caused by a stroke of lightning striking the open door of a magazine. This is quoted by the newspapers who have also published the account of one eyewitness of the explosion who holds the same view.

Report is hereby respectfully submitted.

Operative C117.

CHAPTER IV

Extracts From the Diary of Bob Adams

(Time—1924-July, 1926)

NOVEMBER 11, 1924—I wonder if there can be any connection between the cosmic ray of which Milliken speaks (by the way "cosmic ray" is a terrible phrase, but I suppose newspapers must be newspapers) and the emanations from the Coolidge tube? It would be worth investigating.

December 3—Bought a Coolidge tube. Certainly the idea of extra-heating the cathode is very ingenious. I suppose Dr. Coolidge has already thought of heating the anode as well, but it might be worth while to repeat the experiment on my own.

January 8, 1925—What would a medieval alchemist give to have one of these Coolidge tubes! The Philosopher's Stone realized! Imagine reducing a gas to an amorphous solid, simply by unseen

emanations, and imagine making a stone glow with light. Coolidge writes me that he will announce his results to the scientific world at the next meeting of the American Association. That's in 1926 and gives me a year or more to work on improvements.

January 24—If the emanations from the Coolidge tube produce such remarkable results, why couldn't one build a bigger tube and get still more remarkable results. Believe it worth trying.

March 19—Well, it was a bust. The big tube is built—six feet tall, platinum cathode, extra-heating arrangement, nickel shutter and all the rest of it. Today I tried it on a white rabbit from the Polyclinic. I ought to have known better though; of course the load would be too heavy for any ordinary current. I wonder if I can get a Niagara Falls connection via Easton.

March 23—I'm to have the power cable, it seems. These big companies! They act as though they were doing you a favor by selling you something. Fortunately, Howells, third vice-president, or panjandrum or something, knew my old prof at Rensselaer and I got away with it. Meanwhile, I wonder whether one wouldn't get a more powerful emanation by using something other than platinum or tungsten for the heated cathode? It seems to me that these refractory metals give off the least possible amount of emanation.

March 28—A steel cathode clearly would not do; neither would molybdenum; they are too inert. I want something almost radioactive in its own right. Thorium or uranium, now—

April 12—Got the power today and tried out the giant tube. Result, one bald rabbit and one burned hand. I must be careful of these emanations or I'll be crippled. Not that it matters, but it would be a hindrance in one's work. Wonder how the rabbit feels?

April 15—Rabbit doesn't feel any more. Emanations were too much for him, I take it. His hair had commenced to grow out again, though, and not white but black and coarse. Singular transmutation. Evidently these emanations are very powerful indeed, and I can think myself lucky with only a burned hand. Ordered some thin sheet lead to construct a shield for myself and for the wall of my laboratory.

May 20—Made a small tube with a thorium cathode. Got interesting results all right while it lasted. Turned it on a test-tube of methane (Coolidge's experiment with his tube) and got not the amorphous brown power but a mild explosion, with trace of propane as an end product. This looks promising. But the thorium melted in approximately ten seconds.

June 15—Tried a uranium cathode. Got another and more violent explosion, more traces of propane and a cut on the arm from flying glass. Again the cathode melted before the experiment was complete. Clearly, I'll have to find a way of hardening up my metal or else use a harder metal. But what harder metals are there? There are the more or less inert type, like iron—these are useless; and the extra-hard ones, like tungsten, which is what Coolidge has been using. No, the only way is to harden my uranium or thorium. I wonder, too, if the emanations would set up such violent disturbances in other volatile compounds as to cause an explosion?

July 18—Tried 00-7 5-29-23-16-21 35-14 12-3-28-25-35-20-14-35-00-24-12 36-3-14 21-4-1-26-7-36-3 20-2 9-14-17-28-32-22-16* and got a cathode that lasted 45 seconds under the power I gave it. This is genuine improvement. Still the 00-18-10-28-2 was not altogether satisfactory; it was difficult to mix and separated under the heat; the emanations didn't give at all the effect I had counted on. Evidently the nickel screen holds up some of them, thin as it is. However I managed to explode a test tube of gasoline with it; and the test tube was sealed with wax.

July 26—Still working on hardening process for my cathode. Have wired to Schuckert and Merck for more of the rare earth metals. Some of these may be the solution of my problem—I've tried most of the ordinary ones.

August 9—Even if the cathode only lasts for a few seconds, such a tube should be of considerable value. At close range it will produce explosions all right, but what if I could lengthen the range? Got another cathode that lasted 50 seconds—this time with 0-14-28-3-31-15-29 5-28-36 3-35-7-27-12-22-4-28 18-35 4-22-15-14-34 19-26 0-26-22 0-12-13-17-25-2-18. Killed a guinea pig with it at three feet. I seem to be dealing with truly elemental forces.

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* Thus and all subsequent passages of cipher in the Adams diary, it has now been determined, are in the famous roulette-wheel code, the parent of all the modern wheel-code ciphers. Fortunately for the world it proved altogether undecipherable to the Soviets when they examined the diary. It does not yield its secrets to any of the ordinary means of decipherment, and mathematical means could not be applied because of the comparavitely small amount of the cipher to be found in the diary. Indeed the secret of this cipher was not learned until Adams himself told it later, and as the diary was not then in his possession, he mentioned it only casually.

The cipher is based on the roulette wheel, on which the numbers from 1 to 36, with a zero and double-zero appear in irregular order. To write (or decipher) a message, a card is prepared, bearing the letters of the alphabet in their normal order, followed by the most commonly used letters (E, T, A, O, I, N, S, H, R, D, L, U) making just 38 to compare with the numbers on the wheel. This card, which is circular and slightly less in diameter than the roulette wheel is then fitted over it. For each letter in the message the corresponding number that appears above it is written. The first A on the card is placed under the double zero. Thus the first word in Bob Adams' diary is "an." When a letter is twice repeated in a word, its second appearance is represented by the number that appears above its second appearance on the card.

Thus far, the cipher is a "simple substitution" cipher and would be easy of solution. But after each word is written, the card containing the letters is moved one place to the right, giving each number a new value. Thus the second word in the cipher message quoted above is "alloy." A, which was represented by OO in the first word is represented by 5 in the second, and the two Ls are represented, respectively by 29 and 23, thanks to the double appearance of the letter on the card.

This cipher was one of Bob Adams' minor inventions—Editor's Note.

August 20—The lead screen that I have to hide behind is a perpetual nuisance. I ought to have some kind of a screen around the tube itself that would protect me while I'm close to it. Or better still, a reflector on the inside of the tube, that would enable me to cast the emanations in a small, controlled beam in any direction I wish.

August 31—Perhaps the trouble lies in the screen. True, nickel can be rolled thinner than anything else. But nickel seems to hold up some of the emanations. I wonder what could be done with a pure cobalt screen?

September 8—Tried the small tube with the last type of cathode and a pure cobalt screen, rolled as thin as I could get it. Almost no emanations at all, but these are very potent, and of a new type of rays. I shall call them delta-rays. Took the nail off my right little finger in about three seconds with it when I became incautious. My screen is too thick.

October 30—For the past month and a half I have been experimenting with cobalt, trying to get it thinner. Have decided that the only way to do it is invent a special process of my own.

December 12—Got it at last! The perfect cobalt screen. 16-36-26-24-3-31-12-0-13-28-7 12-20 3-0-35-36-20-15-8 4-16-1-7-14-20 26-3 21-26-31-9-4 2-28-9-22 32-29 25-0-21-18 17 3-12-35-6 3-22-19-7 28-12-34-32 12-34-29-8-35-31. Thin as the nickel screen and allows all the emanations to come through. Also lengthens the life of the cathode. Tried it on a pinch of shot-gun powder and burned it up at once. Now to get a cathode that will stand up, and a reflector. The tube is a perfect fiend for eating up power, though.

January 26—Have asked the War Department to send a man up here. The U. S. Army ought to know about this. If I have the wit to dope out such a ray, somebody else may, too, and they ought to know what's going on. Foreign investigators might apply it in a bad way for this country. Besides I might pop off some time and somebody else might get hold of it. Still working on cathode and reflector; the latter quite as much of a problem as the former.

February 9—Big improvement with the new cathode. Stood up for two minutes before melting under the heat and impact. Also got a convincing and unpleasant demonstration of the range of these delta-rays. Just after I had turned the apparatus on—I was working with a sample of quartz as a target—I heard shouts from the road and went out to see what was the matter. A car, which had been trying to work its way through the snow was standing there, all afire, with the owner pathetically trying to shovel snow onto the blaze with his hands. It was a big machine and the fire seemed to be coming from the gasoline tank at the back. "Can't imagine what made her catch," he said, as we stood watching it burn after he had given up. "Just as I came opposite your place I heard an explosion and looked around and there she was burning to beat the band. Might have been the exhaust, but hell! the exhaust is quite a distance from the gas tank." It must have been the emanations from my tube all right. I felt sorry for the poor chap, but of course couldn't tell him about it. Hope he was insured. Heavens, imagine the power of the emanations I'm getting if they will set off gasoline in a closed container through the wall of the laboratory at a distance of two or three hundred yards! Why, it's a ray. It will be necessary, however, to take precautions in the future. Sent for more sheet lead, and am going to line the room thoroughly with it. A lead shield, or lead-loaded rayon clothes for myself wouldn't be out of the way, either, I suppose. I can arrange the switch for the big tube to be worked from the floor, behind and under the lead shield.

February 13—Reflector moving along beautifully. Get increased power on emanations directly in front of tube, and no dispersal. But will it work on large size? And the cathode! The cathode! If the new one fails, I'll be in despair.

February 27—No answer from the War Department. Damn! that's the trouble with these government agencies. They are so wretchedly hard to move. Maxim had to sell his machine gun to the Boers before anybody would believe him in his own country, and Fulton tried half the governments of Europe with the steamboat and submarine. Truly, the way of the inventor is hard. Tried the new cathode. Best results yet. Killed a rabbit in two seconds. 14-00-22-36 35-29-5-16-1-36 32-9-22-15 16-35-20-36-12-5 0-2-29-9-4 31-20-21-7-15-9-22 29-32-2-0-25-26-14-18 35-32-18-9-17-22-19-33 4-22-25-15-28-7 2-0-13-6-16-7 29-28-15-12 32-21 12-28-35-2 11-34-20-25 13-32 26-3-30-32-34-1-13-10.

March 19—Sill no answer from the War Department, in spite of a second and a third letter. How stupid governments are!

April 12—Think I have the perfect cathode at last. It stood up half-an-hour under current this afternoon, and ran my electric bill to fabulous figures, besides exploding everything of a volatile nature I could bring within range without exposing myself. Indeed this seems to be the chief purpose in life of my new tube; but I must be careful about those burns. The emanations seems to affect the nerve tissue in some way. Shouldn't wonder if it produced insanity of a sort in humans.

May 14—Think I will build a big tube, of ten-foot dimensions, then walk into the War Department down there and dare them to let me try it on some of their explosives or gasoline. Tried kerosene today. Got some gases and a heavy carbon residue under long exposure; at first very little result. Not volatile enough. Evidently, I can't either explode it or set it on fire. But gasoline, that's different. Why these emanations of mine—or this ray, for that's what it amounts to—will bring an aeroplane down in flames in ten seconds, provided it isn't so high up as to be out of range. And I ought to get good range out of a big tube.

Wonder what it would do to a hydrogen-filled balloon?

May 19—Big tube progresses satisfactorily. Tried the small one on a test tube of hydrogen. No explosion, but got an interesting result from the chemical standpoint. Apparently I now have two gases, as a result; one of them rather cloudy and heavier than the other. I must have broken up the hydrogen atom. Will send it off to prof. at Rensselaer and have some of the chemistry boys analyze it. That ought to give them something to worry about.

June 6—Met a young fellow named Schneider, quite a nice chap really, down here for a rest. He's an electrical engineer, too, and interested in vacuum tubes.

June 19—Showed Schneider some of the early efforts at tubes made before I had found the cobalt screen. He suggested on his own hook, some other metal than nickel as a screen; believes that nickel holds up the emanations. Was I right about someone else following up my line of research? Yet those idiots at Washington won't believe it.

July 8—Finished the big tube. She eats power like a dozen arc lights, but certainly is a wonder. I could probably blow up every automobile and gasoline station for miles around with it if I were to turn it loose, not to mention the supplies of shells for the family shotguns. Must show it to Schneider. He'll be interested.

CHAPTER V

Portrait of a Gentleman in Exile

(Time—Winter of 1929-1930)

"YES, little father, I will be glad to put more wood on the fire. Is there anything else the little father wants? Perhaps the commissar will call on us today with a gift for the little father."

"Mmmmp," remarked Bob Adams, on whom the major portion of this torrent of words had been lost, and who did not care about what he had understood of the minor portion.

In the somewhat more than a year he had been there, he had picked up enough Russian to make the ordinary needs of existence known in somewhat halting fashion, and he was as comfortable as it is possible for one to be in a tiny hut surrounded by snowbound forest and with no diversion except one's thoughts and the occasional book brought by his jailer.

As to how he had got there he was more or less in a haze. He remembered the grim ring of Schneider's revolver pointing straight at him, the drip of flame from its lips; and he had a dizzy consciousness of having wakened, weak and sick with pain in a closed car bumping over country roads at high speed. There was a dazed recollection of endless hours on an evil-smelling shelf under foul blankets in the dark—a shelf that swayed to and fro to the maddening accompaniment of pounding water somewhere outside. He remembered a sudden flash of sunlight and air, then more hours in a cubbyhole like the first, And finally he remembered, feeling weak and slow as he was led along a wooden dock among people who wore astrakhan hats and spoke Russian.

Then after long hours in a train, a garden and courteous attendants, where he had recovered his strength and something of his interest in life. Finally there was an office and a polite gentleman who spoke perfect English, gave him a cigar, and demanded in the calmest manner possible the formulae for the cathode, the cobalt screen and the reflector of his ray tube, about which the gentleman seemed perfectly informed.

Now he had been here for something over a year. It was impossible to keep exact count. Here—where? He did not know. Achinsk, said the two guards with the red star of Bolshevism on their hats, but he was not enough of a geographer to know where Achinsk might be save that it was several days' journey from where he had met the man with the cigars. From his front door he could see nothing but trees—cedars, mostly—showing dark green against an endless vista of snow, with the ice of a frozen river gleaming far down the hill in the distance.

Once or twice a month a man who had introduced himself as "Stensoff, Commissar of the Eschgan, at your service" visited him and brought a book—usually a French or German translation of some Russian writer praising the Social Revolution, subtly or blatantly. Stensoff, Commissar of the Eschgan, was about due that day. Bob wondered if he would get a newspaper. Sometimes one was accorded him as a great favor.

Stensoff was disposed to talk of literature that afternoon, the subject of the ray tube having been barred long before by an agreement after Bob had refused to talk about anything as long as it was brought into the conversation.

"You should really keep a diary, my dear Adam, he said (he always called Bob "Adam," a fact which irritated the American intensely) "the diary of an American on the banks of the Yenisei, ha—ha! It would be worthy to rank beside that of Marie Bashkirtseff and Pepys. You men of ability are always good writers when you choose.

"What would there be to record?" asked Bob, "that Gavril has shot a partridge, and more snow came this afternoon? No thank you."

"Thoughts, my dear Adam, thoughts. The Greeks were correct when they assigned thinkers the highest place in the commonwealth. That is why we Russians will ultimately succeed to the rule of the world. Our great men are all thinkers, men who take the time for meditation. It is a habit you westerners should cultivate. And if you did not wish your diary to be too public, you might keep it in a code, like Pepys."

"Ah, yes," said Bob. It was really too obvious. "So you got hold of the diary I used to keep did you? And you want me to give you more samples of the code I used so you can work it out. I

thought that in order to keep relations smooth, we had agreed not to discuss the question of my invention?"

"What difference, really, my dear Adam? Your code will be read some day. You only delay. You know that you have been reported dead and missing in America. Here you have the golden opportunity to make the name for yourself. Change your name and what is it they say?—attach your cart to the rising star, says your proverb. The Soviet system is certain to spread over the world—what a glory for you if you are the instrument of its immediate victory! Think of three hundred Milliards of people grateful to you!"

"I can do without their gratitude," said Bob, rising to signify that the interview was over.

Stensoff remained seated. "You are the foolish," he remarked, amiably. "Solitude is time for reflection, not so? Think it over still more. We will analyze your tube in time and then where is gratitude? And what is the gain to you? You only delay."

"Yes? Then why are you so anxious to have me tell? Good bye."

Stensoff flushed. "Let me tell you my dear Adam," he said, rising in his turn, "that the central Cheka has authorized to take serious measures if you do not honor us with information at an early date. I have been most patient with you, and it is my intervention that has preserved you from serious measures thus far. Bear in mind that to me personally you owe a debt of gratitude, for I have well treated you. This will not always be."

It was evident that the Soviets were becoming urgent about getting the information they were after, mused Bob, after Stensoff had gone. He wondered how far the Commissar of the Eschgan would dare to carry his "serious measures." Not too far, he decided, for he, Bob Adams, was too much like the goose that laid the golden eggs, and the Cheka, much though it might favor energetic measures, would not willingly cut off its last chance of learning the secret of his tube. Still he had heard of tortures.

The short Siberian winter day had ended, and Gavril, one of the guards, had come in with a brace of heathcock, which he had begun to prepare for dinner, humming to himself some Russian peasant melody. Vladmir, the other guard, was sleeping, snoring heavily, as a pig might.

There was a knock at the door. Gavril dropped the heathcock and snatched up his rifle, shouting, "Who's there?" Vladmir sat up in his bunk, mumbling sleepily.

A voice said something unintelligible in Russian. "We want no visitors. Go on to the village," said Gavril loudly, without moving toward the door. Again the voice answered, apparently wheedling. Gavril moved sullenly across the room and flung back the bolt. The door swung open to reveal a fat man of medium height, obviously Jewish, who choked and gasped in the smoky atmosphere of the little hut. He bore a pack on his back.

"Thanks to the kind gentlemen who are so good as to let me in," he said, setting his pack on the floor. "Will the kind gentlemen have some tobacco?" and undoing the pack he pulled from it a huge plug of light-colored Turkish tobacco which Gavril accepted with a glance of silent suspicion. "I am on my way to Krasnoyarsk and being lost in the woods could not find where I was going in the dark. Will the kind gentleman be so good as to permit me to spend the night?

Gavril growled inarticulately and went back to his heathcock picking. Vladmir blinkered stupidly at the newcomer and then lay down again on the bunk.

When the frugal supper of heathcock, black bread, and steaming hot tea was prepared, it was Adams who offered some to the peddler. He thought he saw the latter's eyes widen at the tones of his halting Russian, but as there was no comment beyond a murmur of thanks, dismissed the idea as imaginative. Shortly after, all four prepared for the night, the Jew spreading his heavy coat on the floor before the fire and laying down his pack as a pillow.

Still thinking about Stensoff and his "serious measures" Bob drifted off to sleep. It must have been about midnight when he woke to find the room more than usually filled with smoke, and a choking sweetness in the atmosphere.* The fire had burned low. Just visible from where he lay it resembled the eyes of fiery dragons. They seemed to move; the dragons were on the march; he could almost hear the clumping of their heavy feet—beautiful dragons, armored in jade and chalcedony. And he, Robert C. Adams, was the king and ruler of these dragons and measureless kingdoms beside. They would come to his call, would devour Stensoff, Commissar of the Eschgan, and on their burning wings, bear him across the ocean to his home. They knew him and obeyed him because he had the secret of the tube. He was prince of many magical realms, and these dragons, enchanters he had tamed, were his servants. He could hear shouting crowds waiting his coming. Solomon's Seal—what was it?—Solomon's Seal that would evoke the genii of earth and sea, it was his. There was one, now, an ugly, powerful squat geni with great goggling eyes and an absurd long nose between him and his dragons, bowing before him to do his will. The geni was seizing him to bear him off through the air and show him the realms that were his. He could see the straining shoulder muscles of the huge, obedient shape. . . .

Bob Adams awoke to the pricking of a thousand needles, an unutterable feeling of agony, and a sensation of cold. Over his head a cedar branch was swaying and creaking gently in the night breeze and his hands felt the cold touch of snow.

* With regard to Bob Adams' dream, which he often described in later years, see the footnote to the next chapter.

Looking down at him was the face of the Jew who had come into the hut.

"Nu. You are gradually coming to wake. Ain't it that you're Robert Attams?"

Bob's head was clearing. "Yes, I'm Robert Adams. What of it?"

"Maybe I should tell you a bedtime story, but I ain't got time. Your frients will be coming after us. Hurry!"

Bob sat upright and took the heavy fur cap the other was holding out to him. "Who are you? How did you get me out of there?"

"I'm Abe Epstein. I keep a tobacco store on the Bowery by Broome Street. Some frients of yours got worried and said, 'Abe, you're going to Russia, ain't it? Look up a frient of mine,' so to oblige a frient I did it. Here's a gun."

Bob took the proffered weapon and the pack the other handed him, and together they set out, their footsteps creaking in the snow, under the frosty sky of a Russian winter.

CHAPTER VI

An Odyssey of Two

(Time—Late Summer, 1930)

LETTER received by Walker Adsill of the U. S. Secret Service from Abe Epstein, dated from Baku, and forwarded by members of the U. S. Naval Oil Mission there.

Please send me some more expense money have it placed at my credit with Mr. Pappanikolou in Constantinople, for when I get there, or how do you expect I can get along without money. It costs a lot to travel when you got to pay the expenses of another man beside yourself.

Well, I found Mr. Adams like I cabled you from here today and he is with me now. I was a long time doing it and we was a long time getting away from the Russians. You see it was this way.

I went to Russia like you told me by way of Poland and said I was a tobacco man looking for new kinds of tobacco which was true and wondering whether it could be grown in Russia. Well, I went to Moscow first and began to talk about starting tobacco plantations in Ukrania which is southern Russian and pretty soon the news began to get around and by and by they sent a Soviet commissar to see me and come talk to the central committee on industry about it and I began to get somewhere. There's a great business there if a man could ever go into it but they want to put an awful tax on your profits so I played shy and said I didn't know about that and how about protection because I heard there was a lot of robbers loose in Ukrania.

"That's all right," said the Commissar and some of the committee. "We'll give you protection against the Cossacks. What the hell, can't we keep peace in our own country?"

So I said what about guaranteeing it and I didn't know whether tobacco would grow there anyway it was so cold. Then we argued a lot more, but in the meanwhilst I got hold of a cousin of a brother-in-law of mine that knew somebody in the army there and got him busy trying to find out what he could about the ray and Mr. Adams.

He said that some awful funny things were going on in the army and that the man I connected with belonged to a special batalion that was geting some special training. He said they were dressing all of them in lead armor which was the most foolish thing he ever heard of and that the special training was with some kind of bombs covered with lead. I thought that looked kind of good like they were using something new anyway and maybe it had something to do with Mr. Adams's ray, so I stuck around and argued about tobacco some more, and then my brother-in-law's cousin said that a lot of the soldiers in the special battalian had gone blind and the rest of them had been given real thick glasses. So I thought that looked a lot more like some kind of a ray and I stuck around.

I couldn't find out much more about the ray business, though, except that they only used it for a little while and didn't have much of it, so I started out looking for our young friend Mr. Adams.

Another friend of a relative of mine that is a cantor there and has a relative in the Bolsheviki police told me they were shipping prisoners along the Trans-Siberian railway line the old Czars used to use only keeping them in small yurtas with guards over them. So I thought that might have happened to our young friend, and started out along the railway line with a pack of tobacco like one of these traveling tobacco peddlers. They are very anxious to get tobacco and I would of made money on the trip only some bums stole a lot of my tobacco one night at Chelyabinsk.

Well along at Taiga I begun to find the little yurtas like they told me about. In each one of them was an important prisoner and 2 guards with guns. I found one with a German fellow in it that said he knew enough to hang Leonid Krassin and offered me a lot of money and a note to take out to some friends of his, but I thought it would be a good idea to have a great reputation amongst the Reds and so I gave them the note and they gave me some Polish money.

Then I got to thinking that if I found our mutual friend in one of those yurtas how would I put the guards out of the way, so I found where some hemp was growing near Taiga and got a log of churrus.* Maybe you don't know what that is Mr. Adsill, but its like chewing gum and

*Abe Epstein's somewhat ungrammatical explanation of the properties of churrus is approximately correct. Churrus is the resinous exhudation of the hemp (Cannabis sativa) from which the narcotic drug bhang, hashish and ganja are also prepared. Its action of the drug is believed to be due to the presence of cannabinon, but it contains at least two other alkaloids (cannabinine and tetano-cannabine) and the exact composition of it has never been satisfactorily determined. The users of the drug swallow or smoke it, and as both cannabinon and cannabinine are

when you burn it, it sure makes great knockout drops because the guy that gets some of it sure has a wonderful pipe dream and passes out for the day.

Well, I went along and it got to be awful cold it was January by this time and one night I came across a yurta outside Achinsk where there was a couple of these guards and a young fellow that spoke bum Russian with a heavy English accent and I thought he might be the man we was after, so I figured slipping these guards the knockout drops wouldn't hurt them anyway. So I got outside and put a branch acrost the chimney to kind of choke the air and when everybody got to sleep I laid down in front of the fire and tossed a lot of the churrus on it and put a handkerchief over my face. By and by I got up and hauled the young fellow outside and brought him to.

He was Mr. Adams all right, so I went back and swiped the soldiers' guns and packs for us and their boots and threw them into the river through a hole in the ice and that was a shame because they were worth at least $15 a pair.

Mr. Adams says that they got hold of a big tube of his that makes the ray and you was right that was what it was that blew up the arsenal. But he says they don't know how to make them (the Reds I mean) and they got hold of diary of his that tells where the formulas for making the ray tube are hidden but it was all in code and they couldn't read the code or make him leak. And the reason a lot of the Bolsheviki battalion went blind is because they didn't know how to handle the tube in the right way.

I knew if it was so important as that that they would be chasing us pretty soon, so we hurried. Mr. Adsill, we had a hell of a time. I'm sort of scared of a gun you know my father was shot by a gunman when I was a kid not that I'm yellow but I don't like them, so Mr. Adams had to do most of the hunting and sometimes things was scarce and we had to eat a kind of a big rat that lives there with a long tail.*

By and by we got to Minusinsk. I figured they would be looking for us, so I got Mr. Adams to hide outside the town and went in alone. Sure enough it was full of soldiers in the Bolsheviki army and some of them was looking for us. But I said I was a Bhoziyat which is a Mohammedan and was making a pilgrimage to Mecca so they sold me a couple of horses and we started off again towards Baku.

At Biysko, we figured we had got by them all right so we rode into town and my tail was all sore from the saddle and who did I meet right in front of a house but one of the Commissars I met in Moscow and he got fresh right away and wanted me to come into the house, but I got on the horse again and started off. So he yells for help and pretty soon we saw them coming after us. Mr. Adsill there wasn't any place to hide if there was a tree in that country they'd keep it for a souvenir, so we just went along for a ways and then stopped and Mr. Adams he started shooting at them. He got one anyhow and put down the horse of another one so they laid off and we went on. But our horses got tired and we didn't have any food, so we had to shoot one of them and it was luck for us that we got so far as we did.

So we turned into the mountains and hid around there for a month or so till we figured they had stopped looking for us and we had to shoot the other horse, too, and it was some job to get to the next town which was Semiplatinsk.

I bought a couple of camels for us there, putting up the old stall about being a Bhoziyat on my way to Mecca it went over great. But I was a little nervous about hooking onto any of the caravans so we had to try for the desert alone and I'm telling you Mr. Adsill we ate sand before we got through but here we are and maybe the Soviets don't know we got away but I wouldn't count on it so we'll probably get to Constantinople all right.

Yours faithfully,

Abe Epstein.

PART II

PROLOG

Another Word From the Editor

It is no doubt bad form for the stage manager to step into the middle of the scenery while the play is going on and explain what happens next. In the present case the excuse is that the actors seem to have disappeared. If the stage manager did not trouble to explain the course of events the audience would be left to gaze at an empty stage and conjecture what had happened in the interim when the next act opened.

To put matters more briefly and clearly, our certain information ends with the arrival of Robert Adams and Abe Epstein at Baku. This took place in the fall of 1930. Both men seem to have been in bad shape when they arrived, weak with hunger and suffering from fever. Baku was then even more than now a crossroads of the world, where people of every stock on earth jostled in the streets. And the chances are that the two Americans had not

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volatile it is probable that its extraordinary effect on the human individual when smoked is due to one or the other of these. When smoked it causes a lowering of the sensations of pain and touch until they are almost entirely absent, this is followed by pleasureable sensations, a feeling of great mental brilliance and dreams that amount to delusions of grandeur. Abe Epstein evidently provided himself with a good deal of it; when he ignited it at the fire after the other inhabitants of the hut had gone to sleep, he filled the hut with the smoke of the drug and thereby sent them all into a drug dream. As there is always a clear space of a few inches at the floor when a room is filled with smoke, he himself was practically immune. Moreover he took precautions. It involved Adams as well as the guards, but he was prepared for this, and revived him when he got him outside, while the guards were left to sleep out their drug dream, probably until the next evening. —Editor's Note.

* Undoubtely the steppe hamester which abounds in this part of the world.

been there an hour before word of their arrival was on its way to the Soviet government.

At all events, two nights after they arrived there was a severe street riot between the Uzbegs and Georgians, which the police proved powerless to quell. The building occupied by the American Naval Oil Mission was one of the first to be burned in the turmoil. Several of the occupants were badly hurt as they escaped, and among them was Robert Adams. There seems little doubt that the riot was engineered from Moscow. The combination of the injury he received and his already weakened condition seems to have brought about in Adams a case of amnesia, or loss of memory, for there is a record from the Bellevue Hospital in New York, dated from the spring of 1931, recording his entry there as an amnesia patient.

He must have communicated to Abe Epstein or to some other American authority information as to where the formula for his tube was hidden. In spite of the fact that the singular loneliness of his life made his recovery from amnesia a matter of years, nothing is more certain than that the United States government secured the formulae at an early date.

Among the scanty records remaining to us from the period of confusion that followed is one from the fall of 1930 in which it is mentioned that a model Adams Ray tube had been set up and tested at the Indian Head proving ground of the U. S. Navy, where it set off various samples of ammunition. We also have the testimony of Albert Rodman, a naval mechanic who later rose to be governor and major-general of New Hampshire. In his autobiography he tells us that he was employed in sheathing the magazine of the battleship "West Virginia" with lead giving the fact that it was a rush job as the reason why he was unable to obtain Christmas leave in 1931.

He also mentions that the new cruiser "Minneapolis" had a tube installed in the turret on her foredeck. Evidently the U. S. Navy took up the Adams Ray from the standpoints of both attack and defense in a whole-hearted manner. The Soviet government can hardly have been ignorant of this fact, since its secret service was unusually good and must have determined to strike the long-planned blow before the development of the ray rendered it impossible.

But from this point on we are in the midst of wars, rumors of wars, tumults and confusion. The great combat of the Northern Alliance was opening, and there is little sure information as to minor events and places. We can only discern the general outlines. Even the name of the great pioneer who first experimented with the device later brought to perfection as the Wagstaff is unknown to us.

We have attempted to gather up the records, such as they are, and have inserted documents wherever documents are available. But the main purpose of this book is to give a coherent narrative of the underlying events which really influenced the course of history, and if it seems disjointed and impressionistic it is because the records from which it is compiled are in a confusion so hopeless that they may never be unravelled.

CHAPTER I

The First Blow

(Time—Spring of 1932)

IT WAS one of those hot days that spring sends to Washington as an earnest of what summer will bring, and the young man who entered the Pennsylvania Avenue drug store took off his hat and fanned himself with it as he slipped into a chair.

"Coco-cola with a shot of lemon, Ed," he said, "did you order this weather?"

"Not me. I wouldn't know what to do with it if I had it," answered the guardian of the fountain, manipulating his faucet. "Say, what d'you think? That dame Bella never gave me a tumble when I called her up. Said she was all dated for the week."

"You don't know how to handle that baby. You have to treat 'em rough. Tell her Jim Blunt said if she didn't go out with you he wouldn't take her to the Grotto any more . . . Hey, can you be sick or something tomorrow night? I got a couple of ——"

"Shh, there's Doc White." A bald-headed man with a protuberant stomach had appeared at the end of the fountain. "What was that?"

"Tire blew out I guess."

"Must have been a truck," said the soda fountain boy. "That was a big one . . . What's yours, ma'm?"

Bang! "There goes another one," said the young man who had described himself as Jim Blunt. "No wonder. It's hot enough to melt rubber."

Boom! A deep, heavy explosion this time. The building trembled gently.

"Say, what's going on?" said the soda-fountain boy, looking over his shoulder, as though an inspection of the front window would reveal the source of the sounds.

"Prob'ly some ambassador or something. What have you got in the third at Latonia?"

Boom, boom . . . "Annie Lee. Six to one. It's a good short end bet."

"Aw, I dunno. She's not so hot. Racing Form says Little Michael is a breeze."

Boom, boom, boom . . . A man outside had stopped with his hand at the door and turned back, looking up.

"That goat! Why he run last in the Withers. He's nothing but a plater."

Boom, boom . . . Doc White, the man with the protuberant stomach and bald head was sliding along behind the counters, toward the door.

"Yes, but I got a hot tip. You know Augie Colman, that little guy that comes in here. He's got a friend that was one of the Stewards down there

and he says Little Michael was pulled his last time out."

Boom, boom, bang! People were stopping outside. A couple of boys ran past, shouting something unintelligible. Doc White was standing in the entry way, his white coat flapping back and forth against the bulking waist-line in the gentle breeze, gazing down the street under an eye-shading hand.

"Aw, go on. I don't give a care what Augie Colman says. Them tips ain't so——"

Boom, boom, boom, Crash! The building rocked; the man standing beside Doc White was gesticulating violently. Somebody passed, running. Shouts.

"Say, what's happening," said Jim Blunt, rising and starting toward the door. Boom—a terrific thunderpeal of sound that seemed to let loose a minor earthquake. He gripped a counter to keep himself from falling. Half a dozen bottles and packages showered to the floor. There were shouts and a universal rush for the door.

The man with the protuberant stomach was trying to rise amid a tangle of feet. Blood, from a cut on his bald head, staining the white coat. People were running. A pillar of smoke like the exhalation from a giant cigar hovered over the trees a little way up the avenue and something lay tangled on the pavement beneath it. A smashed auto was draped weirdly across the lower part of a broken store window.

An accident to one of those squibs, Jim Blunt thought, and started toward it. Boom, boom—and then, as he ran, a bursting spray of branches and fragments flowered out of the pavement not two hundred yards ahead and he was hurled against a car by a gigantic fist.

He rose, half-dazed, to his knees and became conscious of a tear in his trousers. Other people had been knocked down, too; some of them were hurt. Boom, boom—bang! He looked toward the capitol, realized that there was a black gap in its rounded dome and that the figure at the peak was slanting crazily. The street seemed to be reeling—or was he dizzy. A black cloud shot up suddenly in the direction of the Library of Congress. There were flames down the street.

An utter and helpless terror came over him. Boom, boom, boom. A pointed finger was thrust over his shoulder and a voice shouted in his ear, "They're bombarding us." He looked along the direction of the digit and saw the Vee outline of a squadron of aeroplanes sharp against the pale blue of the spring sky. He could hear their buzz above the roar of a passing auto, driven madly with open cutout. Boom, boom, boom. Somebody screamed.

There was an overturned streetcar in H Street with people trying to get out of the windows on the upper side. Blood, Jim Blunt though, blood under that street car. He felt sick. Boom, boom . . . They were coming! He realized with surprise that he was running. A pile of bricks with a broken chair in the middle of it where an odd eddy of the running throng flowed around the scene of one of those explosions—half a dozen houses knocked into one and blazing fiercely with cries from the pile. Everybody was running, riding, flying from the terror that smote down from the skies.

A fat woman clad in lavendar underwear and a half-awry petticoat was knocked against him by a passing car, sending him almost to his knees. Her face was wrought with terror. Two men trying furiously to crank a Ford. Boom, boom, boom. Negroes, white men running and shouting, all other emotions submerged in the ocean of fear. A curious odor mingled with that of burning wood in the air, a sweet smell, almost sickly sweet. He saw a black woman fling herself to the pavement with a choking gasp, unable to go further, and lay there sobbing, with her head covered. The city was burning. Boom, boom, boom.

More cars went by, one of them with its radiator bearing a plume of steam, all loaded, black with people on the running boards. He passed a camera store with its windows broken and saw two stalwart negroes helping themselves to the contents without anyone giving them the slightest attention. A fire engine was trying to make its way counter to the stream of flight, the firemen with pale, set faces, valorous and hopeless. Damn fools, thought Jim Blunt. An Italian family loaded with bundles and a crying baby were pulling more bundles on a child's cart. Boom, boom, boom, went the bombs, away behind him.

The street seemed miles in length, the sick-sweet odor grew stronger. A moment he paused in the tide of fear and looked back to see a pall of smoke lying over central Washington, with the red glow of flames beneath. The capitol was no longer visible, the street away back flooded with fugitives, afoot and in conveyances, but moving apparently with a curious lack of haste.

Above the smoke, like flies on a window pane, the aeroplanes wheeled and wheeled, shedding death, destruction and war on the first city of the United States with none to hinder them.

CHAPTER II

The Coming of Chaos

(Time—Spring of 1932)

THE Ford on whose running board he finally secured a lift broke down a little way out of Washington, and Jim Blunt left it to make his way among an ever-thinning group of wayfarers on foot. He dined frugally on a handful of strawberries searched out among the already well-trampled plants in a field he passed. Along the half-deserted road he could catch sight of other groups of fugitives, like himself, making for Baltimore, but he felt no great desire to fall in with any of them. Just at dusk he descried an abandoned nigger shanty in the sandy scrub along the road and turned off to spend an uncomfortable night, shot with horrible dreams, on its floor.

He was roused in the uncertain light of the early hours by a sharp pain in the calf of his leg and dragged himself to weary feet before an apparition with huge goggling eyes and a black nose of indeterminate length that at first gave him the impression he was still dreaming. It was some minutes before he realized that it was a sailor in a gas mask who was prodding him with a bayonet. Outside on the road were more of these apparitions, who pointed him toward Baltimore and urged speed upon him wtih silent gestures, then moved off, locked in their expressionless masks, toward where a mountain of smoke on the southwestern horizon indicated the position of Washington.

His muscles filled with a great heaviness, Jim Blunt stumbled along the empty road. He would have given anything for a drink, but saw a dead horse lying across the only rivulet he passed. Once he met a truckload of soldiers with a machine gun, headed for Washington, and once a big brown car passed him in the opposite direction. It blared a furious horn at him but did not stop despite the appeal of his outstretched hand, and he caught a glimpse of other masked figures inside, as it swirled past.

Save for these interruptions the road was a monotony of sand and low vegetation out of which stinging flies rose with the sun. His watch had stopped but it was enough after sunrise to be about nine o'clock when he sighted another figure moving Baltimore-ward around a curve ahead and quickened his tired limbs to overtake his fellow voyager. It proved to be an old man who received his advances with unconcealed suspicion, and for some time they trudged along together in silence.

Finally the other spoke. "You wouldn't have some tobacco with you, would you, mister?"

Jim Blunt felt in his pockets. No," he said, "but I got a cigarette." He extended the package, limp with being slept on.

"I don't hold much with cigarettes," said the old man. "Goin' to Annap'lis Junction?"

"I guesso," said Jim. ,It struck him suddenly that he was not going anywhere in particular. There was silence again for a moment.

"It's them damn Germans," the old man burst out with sudden conviction. "Germans and Bolsheviks. They should of hung that Kaiser when they had the chanct. I don't care. I'm covered with insurance. But you never get full value out of them insurance companies."

"Is it all burned?" asked Jim, glancing over his shoulder at the sierra of cloud behind him.

"Burned. Blown up. Poison gas, too. Everybody dead," said the old man. "I'm goin' to Boston, Mass. I got a son there in the bicycle business. He'll be goin' in the army though, I expect. There's war young feller. Have any relations in Washington? Haven't got a bit of tobacco, have you? I got a pipe, but I used all my tobacco."

"No-o-o," said Jim. Burned, blown up, he thought. Poison gas, everybody dead. Bella—and the little blonde that was a waitress in the Childs restaurant. Everybody dead, poison gas. War.

"They should of hung that Kaiser when they had the chanct," said the old man vigorously again, and silence fell upon them once more. The sun grew hot. Jim Blunt felt faint and weak. Another half an hour of walking brought them to a series of sandy strawberry plots, but the rows had been trodden into the ground by earlier comers and there were none but unripened berries on the vines. The houses seemed deserted, though one of them yielded a welcome drink of water from the pump. Both sucked it in greedily. From time to time the old man tried conversation again on the two absorbing topics—his lack of tobacco and his forethought in being insured.

About noon the road brought them to a dip by a small rivulet where half a dozen men, like themselves obvious refugees, were making a meal on bread and burned potatoes around a fire. To them Jim addressed himself in the hope of food, and was allowed a handful of their scanty meal.

"What happened?" he asked between mouthfuls, "Who did it?"

"One of the soldiers says he seen it in a Baltimore paper that it was the Russian Bolsheviks," said someone. "They came in a ship, goddam their dirty souls to hell. Everybody in Washington is dead. They're fighting in England and San Francisco, he says, and New York is all burned to pieces. It's war. I'm going to enlist in the navy, I don't give a damn. They burned my store out and every cent I own, goddam them. Listen here——"

"Aw, pipe down," another broke in. "You ain't lost nothin.' I had a sister—" he seemed to choke and bit savagely at the piece of bread he was holding.

"But what did they want to fight us for?" Jim pursued the subject.

"Just meanness, I guess. They're fighting everybody. They say there's a hundred thousand Chinks coming from Chicago, Chinks and Russians with more poison gas. This is going to be one hell of a war, let me tell you."

His meal finished, Jim rose. "Aw, that's the bunk," someone else was saying. "Them Chinks can't shoot. They don't even know—" He passed beyond earshot, fear and weariness combining to dull his mind to outer impressions and drive him onward anywhere down the hot river of brick between its sandy banks that led away from the ominous bank of smoke towering over Washington. There seemed no sounds left in the world and traffic going either way had utterly ceased. He tramped along in a reverie of misery.

. . . "Are you looking for a job?" The voice startled him like a shot. Beside the road stood a man of about middle age, wearing a battered Panama and supporting a motorcycle that had apparently just emerged from a path back among the sand hills.

"Huh?" What kind of a job?"

"Helping me. Come on, jump on. Twenty-five dollars a week and your board. Save me a lot of trouble." He talked in staccato beats. Jim glanced over his shoulder in the direction of smoking Washington.

"Oh, that's all right. They won't come this way. You'll be helping the country more than in the army. My niggers all ran away. Greatest invention of the age. Hang on."

The motorcycle started with a jerk and Jim had to grip the stranger hard to hold his place. They dashed away into the scrub.

CHAPTER III

The House in the Scrub

(Time—Spring to Fall, 1932)

THE pathway through the sand presently issued on an establishment consisting of three or four shacks of car-doors and corrugated iron posted near the shore of an inlet of Chesapeake Bay. For a considerable space along the shore the sand dunes appeared to have been levelled by some artificial means and in the open space thus formed was a crisscross of wheel tracks and footprints. One of the shacks was considerably larger than the others, and all seemed deserted.

The man with the Panama brought the motorcycle to a stop with a flourishing turn before one of the shacks, and jumped off. "Hungry?" he inquired, with a keen glance at his companion. "Come in. Hope you can run a motorcycle. You'll have to be dishwasher, I guess. I can cook, but the niggers ran away."

He busied himself in a partitioned-off portion of the shack, which seemed habitable enough once one was inside. Jim Blunt noted that there were two bunks against the wall, one above the other, and that a litter of the most miscellaneous character filled all one corner of the room, from which it flowed into the central space—a heterogeneous assemblage of dry batteries, pieces of what looked like celluloid, blueprints and gigantic rubber bands.

In a few minutes the presiding genius of the place was back with a cup of coffee and a plate on which hot food smoked. "Help yourself, young fellow," he said amiably, "I've had mine. What's your name?"

"Blunt," said Jim, stuffing the welcome viands into his mouth, "Jim Blunt, from Washington."

"Well, Jim Blunt, mine's Hamilton. I think you'll like it here. Experimenting. You needn't worry about the war. Got enough provisions for an army and we can get fish and oysters right here in the bay. Might be on a desert island. The ten books and all. Are you curious? Never mind, your're all right. I'll tell you. It's fuelless airplanes. Greatest invention of the age. Fellow died and left me to work out the scheme. Can you run a motorcycle?"

"M-m-h-m," said Jim, his mouth full.

The largest of the shacks proved to be the hangar in which the subject of the experiments was housed; an ungainly, short-bodied object with curving wings that bore an odd resemblance to a hen, a likeness which was increased when it ran down the sand behind the towing motorcycle as though to escape from a pursuing hawk. The motorcycle, it appeared, was necessary to give it a start in its present stage of development; once launched on the atmosphere it could take care of its own progress. In the long succession of days that followed, it made many of these semi-avian runs and flights, with Jim guiding the sputtering cycle along the beach, occasionally glancing over his shoulder to see the big, bird-like object rise behind him, eventually casing its tow-rope and soaring about in a staggering kind of flight.

After it landed there was always a period of puttering with this detail or that. One of the huge rubber bands that in some way obscure to Jim furnished the power for the appartus would be tightened or changed as showing signs of wear; a battery would be replaced or a wing-tip altered Once a whole week of tinkering resulted in the lengthening of the wings and a wider spread for the flat avian tail.

Occasionally Jim would be told to climb into the seat of the queer craft, while Hamilton watched its performance from the ground. The first of these trials ended in a minor disaster when Jim became so busied with the question of keeping the machine on an even keel that he forgot to cast loose the tow-rope. The aeroplane promptly pulled the motorcycle, which had reached the end of its run, over on its nose, giving Hamilton a header in the sand, and Jim shared the experience a moment later when the sudden jerk at the end of the line threw him off balance completely.

Fortunately neither plane nor motorcycle was much damaged, and as Jim repeated his experience of flight he gained knowledge and confidence together. At the end of a couple of months he could handle the machine nearly as well as Hamilton, and both were accomplishing flights of considerable duration during which they stirred up the screaming gulls far down the bay or soared high and far enough to see the infrequent passengers on the Baltimore-Washington road.

Jim would have called the airplane an ornithopter if he had known of such a word. It consisted of a light tubular framework in which the operator sat as one sits on a bicycle, with pedals for the feet. Through a complicated system of bands and heavy rubber cords, these pedals furnished the power for the flapping wings, each thirty feet or more long and amazingly light and narrow for their size. In building the latter Hamilton had followed the avian formula, the feathers being made of a non-inflammable celluloid composition and opening automatically on the upstroke to decrease resistance.

An arrangement similar to a bicycle brake per-

mitted the wings to be locked in the outspread position for soaring flight, or in an elevated position for a quick, sure landing. In front of the operator's seat was placed a row of the new Bell & Wyatt dry batteries, then recently invented. These were furnished with two connections. The first was automatic, being actuated by the working of the pedals, and furnished additional power to the motion of the wings, reinforcing the push of the operator's legs. On the other connection (for which a hand switch was provided) they operated a small knife-like propellor of ingenious design which was placed at the nose of the mechanical bird. This was intended to be switched on during soaring flight; it gave the airplane the little additional power that enabled it to maintain height and speed during that operation and float down the lanes of wind, virtually without motion for long periods. The machine was steered partly by working one wing faster than another and partly by means of a wheel that manipulated the tail.

It developed that Hamilton was more concerned with the question of launching his craft into the air than with anything else. Once launched the aeroplane gave no trouble, but getting it off the ground involved either the use of the towing motorcycle or an extremely long and often futile run down the sand under the power furnished by the little propeller. There seemed no way of approximating a bird's swift leap into the air. Attempts to flap the wings on starting resulted only in damage to these appendages when they were banged against the ground.

Jim Blunt saw Hamilton try various expedients. Altering the undercarriage to cant the wings up at the front for a more rapid climb brought the tail down with a resounding thump on the succeeding landing and almost snapped it off. Then came a period of various stilted crane-like types of undercarriage. These permitted a limited use of the wings on rising, but they made the machine almost imposaible to turn and gave it a heavy, loggy motion in the air by reason of the low-placed weight of the wheels. The crane type of undercarriage was followed by an attempt to get quick climb by setting the wings at a sharper angle with the vertical. This experiment ended abruptly in a nose-dive into the inlet, when Hamilton found that the arrangement caused the plane to go into a series of downward swoops when he tried to do anything but climb. He chose a ducking in preference to a crash on the sands, and as a reward had to spend nearly a week in giving the airplane a general overhauling after it had been, with much effort, fished out of the water.

Neither of them ever turned their aerial expeditions toward Washington, and the subject of the bombardment and the conflict that must be raging all about them was tacitly avoided as a matter for speculation only. Hamilton's eyes were too much fixed on the stars for such matters and Jim's too much fixed on the ground. They lived the solitary, happy life of hermits, eating their way gradually through the immense supplies of canned goods Hamilton had laid in to supply an establishment of half a dozen men for several months. In this manner May summered into June, June turned to hot July, and July to blistering August. No rumor of the outside world reached their retreat, no breath of the universal war-flame passed their way. They might truly, as Hamilton had said, have been on a desert island, and the likeness was heightened by the occasional plume of smoke that moved up or down the Chesapeake, just barely within eyesight in the distance. And then the war reached out and took them.

Jim Escapes

IT was a warm morning in early Fall, fresh and clean with the night's rain. They had just finished breakfast and Jim had stepped out of the living shack to wheel out the airplane for the day's flight while Hamilton paused to clear away the dishes. As he bent over to tighten a fastening in the tail, Jim heard the crunch of feet on the sand and looked up to see three or four men entering the living shack. Something metallic gleamed in the hand of one; all wore the trousers of American soldiers, topped by a nondescript assortment of shirts and hats. He noted that two of them were negroes, and wondered idly who they were and what they had come for as he went about his task.

A purr of voices rose within the shack. He climbed to the seat, switched the batteries on and off, and tested the controls. The bark of exasperation crept into what was being said in there. He turned to look. "No! Get the hell out of here!" he heard Hamilton's words, then a sound like that of a trunk thrown on a sidewalk, the door was flung violently open and one of the negroes came out, backward, to the ground. Shouts; Hamilton burst suddenly from the open door, running, with the other negro and two of the white men after him. Jim Blunt heard a growl of fury, caught the look of animal ferocity on the face of the pursuer, noted with a fearful accuracy of detail that there was blood on Hamilton's head and a knife in the negro's hand. He saw the black man spring suddenly onto the back of his chief, bearing him to the ground. With a febrile panic tearing at his vitals, Jim threw the switch that set the propeller revolving and began to move gently across the sand.

He heard a gurgling cry, a command to stop, and glanced over his shoulder to see an indistinct mass of limbs writhing on the ground, the rise and fall of the knife and a figure running after him. The machine gathered speed. He worked the tail desperately in the effort to rise. Would he make it? Bump, bump. "Stop!" A shot; the bumping ceased—he was up! He pedalled with the energy of despair, felt the wings graze the surface of the water and saw a spray of shining drops. He was in the air, running slowly, low over the water.

He pedalled; the airplane rose painfully in the

still air, then leaped forward as a breeze ruffled the surface of the inlet beneath. Up, up—he dared to turn, and saw the men beneath him foreshortened into two-legged spiders, running about animatedly on the sand. One lay stretched out by the door of the living shack, unmoving. That would be Hamilton. No going back now. The breeze grew stronger as he rose. He braked the wings, turned on the propeller switch again and soared up and away like a huge gull, while the four beneath gaped at his receeding figure.

Jim Blunt had only the most elementary idea of geography. Baltimore, and beyond it Philadelphia and New York lay away to the north somewhere. He could make one or the other easily. But—and the thought of the bombardment and what men by the creek so long ago had said, smote him suddenly. Baltimore, Philadelphia, New York—where they not like Washington, "all burned to pieces" with Chinamen and Bolsheviks, gas-armed, haunting the grim ruins? Was it not some outpost of these that had fallen on them at the inlet.

He rose higher, pedalling the wings. Might better find a farmhouse somewhere. There were a few clouds in the northwest. Again he braked the wings and soared along in great sweeps, heading for the north with only the sun for a guide to direction.

It was perhaps an hour later that he ran into the storm. The country beneath him was showing a greener and more settled character, but whether he had passed Baltimore or not he could not tell. His attention was completely taken up with the question of the storm which announced itself in a pattering of raindrops on his face. It simply did not occur to him to land where he was. Knowing from old experience of the difficulty of flying the machine through the gusty flaws that would come, he took one last glance at the sun to keep it on his right, and began to pedal again for height. For half an hour more the wind whistled about him and it was black as night. He tried to keep his direction. How well he was succeeding, he did not know. When at last he emerged into the sunlight, he was drenched, horribly tired and unhappy.

He noted the silver line of a big river somewhere beneath him, felt the sun on the back of his right shoulder. Must have worked a little west he thought, and began to descend to look over the country. He was nearing a city. White buildings showed in the sunlight, and as he approached, he could see little figures among them. He swept nearer and began to make out definite motions among the midgets on the ground. They were pointing toward him, gesticulating. On the roof of one of the buildings, several men seemed to be busy with some kind of an appartus that looked like a pushball with a rod stuck through it and emitted vague lightings like those from a trolley wire when it is wet.

A broad street, innocent of telephone wires, ran past this building. Almost without thinking, Jim Blunt braked his wings into the upright postion, switched on the propeller and dropped lightly to the pavement before the building, utterly exhausted and with a funny numbness stealing over him. He heard dim voices asking what it was, then a sharp word of command, and someone said, "The ray's knocked him out. Call Captain Hargitt." Then Jim Blunt passed out of consciousness.

CHAPTER IV

Two Gentlemen Hear the News

(Time—Spring, 1932)

THE nurse was offering him an egg.

He seemed rather the better of the two cases who occupied adjoining beds in the hospital. For one thing, he was younger than the man who lay in the bed beside him with closed eyes, a neat grey beard sparsely sprinkled with black projecting over the coverlet. For another he had managed to reach a half-sitting posture and was moving a little.

The young man lifted one arm as though it hurt him to move, dabbed the spoon in the egg and took a mouthful.

"Do you feel better?" the nurse asked.

"I don't know," he answered, "I haven't felt at all up to now. What happened?"

"You were in an accident. We'll tell you all about it later. Can you give us your name?"

"Mason. H. Mason, Lieutenant, Navy. What happened?"

"Don't worry about that now. Here, drink this and go to sleep if you can."

Lieutenant H. Mason accepted the drink, looking about him through the bottom of the glass as he drained it. His eyes fell on the man by his side, and he gave a sudden start of surprise, followed by a little grimace of pain. "How—how did he get here?" he said, indicating the older man.

"Do you know who he is?" asked the nurse.

"Admiral de Roebeck, acting secretary of the Navy," replied the younger man, leaning back among the pillows, and there was silence in the hospital ward.

The silence lasted all through the golden afternoon, and it was not until the lights had been turned on that it was broken. Then came the sound of feet in the hall, and of hushed voices in conference, followed by the flinging open of the door and the irruption into the ward of a small and curious procession. There were two nurses, a man in a dark suit with black corded glasses whose nervous air gave him the aspect of one burdened with great affairs, and a tall man with white hair and a flowing robe of black silk over his business suit. Through the door two or three more were visible, and presently entered also a man in uniform and puttees who looked like an aviator, and a physician.

The man with the corded glasses glanced at the

bearded figure in bed, nodding his head vigorously. Yes, that's Admiral de Roebeck, all right," he said, "is he badly hurt?"

The patient who had been thus identified opened his eyes languidly and was now looking at them. The white-haired man with the silk robe came forward and sat beside the bed.

"Admiral de Roebeck," he said, "are you well enough to understand me?" The injured man nodded slowly, and the other went on, "There has been a—catastrophe, in which the President and several members of the cabinet were involved. I am Justice Kenyon of the Supreme Court. It is important that we swear you in as President of the United States and that you nominate a cabinet at once. Do you think you can do it?"

"Yes," said the man on the bed in a voice so weak and far away that it might have come from another world. The justice glanced at the doctor who had followed him into the room. The latter nodded.

"I must ask the rest of you to witness this ceremony," said the justice, rising. "Is there a stenographer in the building?"

There was a moment's pause, as one of the nurses slipped out of the room to return with another girl in nurse's uniform, awed and silent at the importance of her mission, and bringing a piece of notepaper and the stub of a pencil.

The man with the corded glasses produced a Bible from somewhere, apparently by magic, and there in the hospital ward, under the dimmed light and beside the two beds was held the solemn ceremonial of the swearing in of a successor to the great traditions of Washington, Lincoln and Roosevelt, with a sick man, three nurses, an aviator, a doctor and a lawyer for audience; surely the strangest group that had ever seen the induction of a President of the United States.

The new President lay with closed eyes, making his replies in a thin voice, and as Justice Kenyon closed, the doctor stepped to his side with a glass of some stimulant. He drank it and seemed to grow slightly stronger, looking from one to another of the group with shrewd, kindly eyes. The man in the corded glasses spoke. "Would it be asking too much of you to nominate a cabinet, sir?" he said.

President de Roebeck glanced around again. His eyes fell on the bed by his side where Lieutenant H. Mason lay watching him.

"What is your name?" he asked.

Lieutenant H. Mason's arm moved painfully in the gesture of a salute. "Lieutenant Mason, U. S. Navy, sir."

"Will you act—temporarily . . . as Secretary of State, to make appointments if I should not survive?"

There was a murmur in the room. The man with the corded glasses stepped to the bed. "While I do not doubt that you have the fullest confidence in this young man—" he began, but the faint voice of the admiral interrupted him.

"I'd trust a navy man first . . . Nominate Lieutenant Mason as my Secretary of State . . . J. P. Morgan, junior, Secretary of the Treasury. General Slocum Secretary of War . . ."

"I doubt whether General Slocum can be located, sir," said someone.

"All right, then, the highest ranking officer of the army . . . Ralph D. Paine, Secretary of the Navy . . . A. E. Smith of the Interior—" the voice trailed off into silence and the eyes closed again. The doctor sprang to the bed side, looked at his patient a moment, and then turned to the rest. "I am afraid that the president is not in condition to talk any more," he said, "May I ask that you leave?"

CHAPTER V

Conference on a Balcony

(Time—Autumn, 1932)

PAUL DE ROEBECK, President of the United States, lay back in a sheel chair on the balcony of the Mercy Hospital at Alexandria, looking across the Potomac toward the ruins of what had been the capital city of the United States. Herbert Mason, his Secretary of State, sat beside him. Around the two were grouped the other members of the cabinet, and on the other side of a small table the balcony was filled by perhaps two score men grouped in chairs. Most of them were expressing various degrees of annoyance or astonishment in their attitudes or faces.

"But I tell you it's impossible," declared one of them for what must have been the twentieth time. "The American people will never submit to dictation in this fashion. They will demand a Congress and an immediate presidential election."

Mason looked at the president, who nodded. "You agree with us, do you not, that an election at the present time is hardly possible?" he asked with the air of one going over a thing patiently with little children.

"Not in Vermont!" one of them burst in.

"But Vermont cannot elect a president and Congress alone, and many whole states are in a condition which, to be frank, is nothing less than anarchy. We could hardly be certain that a majority of the members would not turn out to be avowed enemies of the present system of government. The Constitution, gentlemen, makes it the first duty of the President to see that each state has a republican form of government. The proposals we have outlined here are directed toward that end.

"Moreover, our entire effort would be held up until the new Congress had been organized and had inquired, more or less slowly, into various features of the war and had appropriated for them. You have been asked to this conference, gentlemen, because as governors of the several states, you are big enough to appreciate that in the time it would take to wait for Congress, it will be too late. The Polish army is on the verge of collapse; the Italians

are beaten, Germany and England can do nothing, and God knows what is happening in France. In a year, gentlemen, we will be invaded by an army of two million men. The steps we propose to take are revolutionary, but they are necessary in this struggle for national existence.

"I propose to read the agenda of this meeting in detail, and we can then present each point for a separate vote."

A somewhat grudging assent came from the group as he took up several sheets of paper.

"First—that martial law be declared in existence throughout the country."

"I agree to that," said one of the audience. "It is a necessary step, especially as martial law is practically in existence in large districts already. Question!"

There was opposition, and the article was clearly carried when the roll-call had been completed.

"Second," Mason went on, "that the governors of the several states be commissioned as major-generals of the army and placed in command of the several states as military areas."

"A most wise measure," said one of the governors, rubbing his hands slightly, and his opinion met with such general assent that Mason proceeded without delay to the third article.

"Thirdly—that enrollment in the army be required from every citizen, by presidential proclamation, and——"

He got no further in the torrent of criticism that rose. When it had quieted down somewhat the President spoke for the first time lifting his voice with obvious effort so that all could hear:

"I am aware of the objections to this plan, and they have been stated by you gentlemen in several forms. Nevertheless, I am convinced that it is a logical step leading out of the declaration of martial law, and that practically it is in the interests of efficiency. The attorney general assures me that legally my position is sound and I intend to carry this thing through even if it means impeachment. Please proceed."

"Thirdly," Mason read, above the chorus of muttered remarks that was reminiscent of distant thunder, "that enrollment in the army be required from every citizen by presidential proclamation, and that all those in essential industries be assigned to their respective duties in their present industries.

"Fourthly—that the people thus engaged be paid through the government agencies to be established for the purpose, and be paid in vouchers denoting so much labor done, to be eventually taken up at a fair valuation . . . This," he broke off from his reading to explain, "is Mr. Morgan's plan. In view of the present state of the currency, the loss of the mint and the destruction of much of the gold reserve, as well as the world-wide disruption of money markets, we are practically driven to adopt some means of inflation or fiat currency. The dangers of either course are so great that this system is suggested as a substitute. It is believed that these labor vouchers will serve the purpose of a minor circulating medium."*

The circle burst into murmurs, and in his clear voice Mason began to call the roll: "Alabama—nay; Arizona—yea . . ." When he had finished there was a majority of two for the article with three not voting.

"Fifthly—that every factory capable of making electrical apparatus be commandeered at once and set to turning out tubes for the production of the Adams anti-explosive ray."

This, like the second article, was carried without comment or objection.

"Sixthly—that no Congress be summoned until the war shall have been brought to a conclusion, or until the Continental United States be held free from danger, and that in its place each of the governors shall appoint a single representative to serve as a committee on the Union."

Again came the choir of whispers and some open comment, and again the vote was so close that there could fairly be said to be no majority. But like the rest it was pronounced carried.

"This closes the agenda for the conference, gentlemen," said Mason evenly, and as he did so, the President pulled himself upright in his chair. "I hope," he said, "that whatever your opinions, I can count on your cooperation. A great deal of the success of our effort and with it I may say, the continued existence of these United States, depends upon this."

CHAPTER VI

The Ray Goes to War

(Time—November-December, 1932)

FROM the Memoirs of Sir Evelyn Oldmixon, Sometime Member of the British Expeditionary Force in Poland.

. . . I was heartily glad when my application for a transfer from the monotonous and dirty hedgerow warfare in Ireland was approved, but was hardly prepared to be sent to the other end of Europe in charge of a tank against the Soviets.

Indeed, if I had known in advance that the government intended sending the tank division, I should have thought that it savored of that Britannic arrogance of which we are always being accused. The date was the autumn of 1932 and our

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* To the people of this age it is almost incredible how much the world used to depend upon metallic currency before the war. Gold and silver, because of their intrinsic value, were used. When a war occurred, every nation at once began to issue large numbers of bills, which were promises to pay so much silver and gold, printed on paper. Naturally, there were soon more governmental promises to pay silver or gold than there was metal in the government's vaults. As everyone was aware of this, the value of the bills, whether in metal, commodities or labor, soon declined, and the government financed its wars by paying double and triple prices for everything. At the same time, the more valuable metals disappeared from circulation, as people would not give them in exchange for the valueless bills. This process was called "inflation" and was viewed as a marvel of ingenuity in its day. To us, it seems simply laughable.—Editor's Note.

fortunes were at their lowest ebb. The immense conspiracy of the Soviets against the peace of the world had been attended by extraordinary success. For the first time since Prince Charlie's day, a British army was fighting British subjects in the island of Britain (I refer of course to the trouble in the Grampians following the Glasgow shop revolt); London and Liverpool were in ashes; Ireland was one vast flame of petty warfare and assassination. Egypt was gone; India and South Africa wavered, and of all the dominions only Canada and Australia stood firmly by the mother country.

In spite of these difficulties the cabinet thought it imperative that we help the Poles; they were facing the main Russian armies, and had, I understand, asked us for a supply of tanks and men who understood these machines.

. . . We arrived at Dantzig on the cruiser "Cumberland" on a blowing night in November. Thanks to the heavy weather there was little danger from submarines, and when off the port we had been convoyed by a German air squadron which effectively protected us from Soviet air attacks.

My impression of Dantzig was that of a city at once splendid and depressing. Over the immense quays and establishments hung an air of loneliness and defeat. One seldom met civilians, and the Polish and German soldiers encountered were a dejected lot. I learned later that the Soviets had dumped a few phosgene bombs into the city in the early days of the war and nearly cleaned out the civilian population.

We arrived in time to meet the unwelcome news of the fall of Koenigsberg and the defeat of General Ruskiewilicz' army before Thorn, which meant that the Soviets had succeeded in driving a wedge between the Germans in the north and the Poles before Warsaw, hurling the two back like a pair of folding doors and opening the way into the heart of old Brandenburg.

General Moorsom, the head of our mission, was all energy. In a day and a half he managed to get the tanks disembarked, and a number of them turned over to the German authorities as patterns for future manufacture. We hurried to the front at once with the remainder, on a train intended to carry rations, which Moorsom boldly commandeered, on the authority that he was the personal representative of the Queen.

Just as we were ready to pull out a man in khaki came down the platform. He proved to be an American, just off one of their ships, which had arrived with a load of Adams anti-explosive ray tubes, a new wonder-working device from the States. He was all for throwing us off the train and holding it while he loaded up. General Moorsom would hear of nothing of the kind, of course, and off we went.

We got to Chojnice on the left bank of the Vistula that night, and began detraining at once. The town was full of Polish troops, most of them badly disorganized, and many walking gas cases. We had all we could do to get through the streets. Food was nowhere to be had, so after the tanks were parked in the grove of an estate near the station the officers of our division made the best cheer we could over hot tea and a few blocks of chocolate. Cavendish, my opposite number, spent most of the night trying to locate ammunition for our eight-pounders, as he spoke German fairly well. I wandered up to the chateau, but found it had been taken over by a Polish divisional headquarters and after a rather idiotic attempt at conversation in sign language, went back to sleep with the men behind the tanks.

Toward dawn a German heavy battery located itself just behind us and began firing with an explosion of sound that made sleep impossible. We stood around the tanks waiting for orders and wishing we had something to eat. But the day was a total dud. The General took Cavendish with him on liaison, and I took over his tank as well as my own. Having nothing in particular to occupy my mind I went down to the railroad station as the most likely covert for something to eat.

About noon a train came in loaded with the Americans and their ray apparatus, big things that looked like overgrown range finders, mounted on trucks. They were a cheery lot and seemed well provided with everything but tobacco, so I arranged an exchange with an American major—Woodbines against tinned meats—and trotted back to my tanks followed by half a dozen orderlies laden with boxes. The American major was fussing around over the lack of electrical lines, a lot of current being necessary for the operation of his apparatus, it appeared. He had plenty in some Bell & Wyatt batteries,* but wanted to save it for an emergency. It never seemed to occur to him that this was an emergency.

The streets of Chojnice were still full of Polish troops, all moving back toward Dantzig. A little later a Soviet airplane came over and dropped a bomb near the chateau that killed a man in the grounds. Then came a gas alarm, and we all got our masks on, but it was a washout. The bomb was preliminary to an artillery bombardment, however. Shells began falling around the chateau, which was evidently the target, and the Poles all came out and hurried away. I got the men into the tanks, which would at least protect them from splinters, and we waited for something to turn up.

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*The invention of the Bell & Wyatt Storage battery, which came about some time in 1931, was a potent factor in the success both of the Adams Ray and the Wagstaff. In its original form it occupied about the same space as the old fashioned "dry cell" (about a foot high by three or four inches in circumference) and was capable of generating a much greater current for a much longer period than the Edison wet battery, which up to that time had been the standard storage battery. The improvements which have reduced its size to that of a match-box are modern, but in its day it went far beyond anything known.—Editor's Note.

The Ray Takes a Part

LATE in the afternoon, the Americans pushed right on through ahead of us. They were anxious to get up to the front lines, though nobody seemed to know where the front line was except the German artillery, which kept coming up on all sides. About seven in the evening the Soviets began to shell the town with gas, and the Germans woke up to a frenzy of activity in retaliation.

The tanks were cramped and the noise was terrific but I dropped off to sleep out of sheer boredom, to be wakened at midnight by an orderly. We had been given some supporting infantry and at dawn we were to attack toward a wood we could just make out at the foot of the long low hill on which we were located. We were warned to use gas masks as the Soviets were drenching everything with a perfect flood of phosgene and gas Alpha. The German batteries were going full blast and I didn't get to sleep again.

A little later came a message from the Americans, warning us not to cross the field of action of their ray, as they might set off the ammunition in our tanks. Here was a pretty dilemna, and I went to rouse out Major Chamberlain.

Together we walked down to where the Americans had strung out their ray tubes behind a big brick wall that had edged the estate. From the little eminence where we stood, we could see the rolling down country stretching away at our feet into the starless night. A dim glow showed on the distant sky where something was burning, and there was an occasional rocket off to the west. The wood we were to attack made a dark mass, just visible. All about, the German artillery was making an irritating noise, shelling the Soviet roads intermittently.

We found the Americans beside their machines, dressed in shapeless hoods and tunics that made them look like spectres in the darkness. An officer handling a telephone set it down as we approached. Their technical service must have been wonderful to get a telephone line in so soon.

"We're going to let go now," he told us. "Oh, you're from the tanks. Stick around and watch the fun. Here, Post, see if you can find a couple of those insulating robes."

The man addressed as Post dug a pair of the shapeless vestments from some cranny and helped us into them. They were heavy and uncomfortable. Two of the Americans began making adjustments on their tube, and after a minute or two stood back. There was a little breathless silence as the officer who had been telephoning closed a switch.

A humming noise rose inside the tube, which swayed a little as a violet glow began to come from it, reflecting on the men about and adding to their ghost-like appearance.

I recall how skeptical I was over the performance. I did not realize that I was fortunate enough to witness a performance as epoch-making as the first gunpowder explosion until some time later. For a few minutes, there was little or nothing to see. Then some flashes from the wood down in front and a sound of machine-gun firing reached us dimly over the noise of the German artillery. I recall wondering what the Soviets thought they would hit with machine guns at that range and turning to Chamberlain to speak about it just as the first ammunition dump went off.

It was not very far behind the wood, and there was a perfect pyrotechnic display of rockets and shells soaring out of the piled up flames beneath, clearly visible from where we stood. A moment or two later there was a second burst like it further to the east and then another.

I turned wonderingly to the American officer. He was fairly dancing with a delight which at the time seemed exaggerated. "It works! It works!" he shouted, "All you fellows have to do is go down there and round 'em up."

The picture seemed a trifle overdrawn but I noted that the sound of the Soviet artillery was no longer perceptible. . . .

Sure enough when zero hour came and we moved forward past the tubes, now fallen quiet, and down the slope, there was not even a machine gun burst to greet us. We found the wood half-full of dead men and a whole battalion of Soviet tanks was standing in a hollow, all of them simply blown to pieces. We pushed right on to the ruins of a village I took to be Kornow-Gallice, and seeing no sign of the enemy, Major Chamberlain halted us and sent runners back for instructions. We had reached our objective and beyond without a single casualty.

PART III

Prefaratory Note

THUS far we have attempted to present, not the usual historical narrative of external events and superficial causes, but a reconstruction of the underlying incidents centering around the discovery of the Adams Ray as they appeared to the actors in that drama. The Adams Ray is the central pivot on which the War of the Northern Alliance turned. To a less degree, the Soviet desire for conquest and the invention of the Wagstaff (which has had so profound an influence on modern society as a means of communication) were the prime movers. Behind all three, the figures of the sinister Stensoff and the lonely Adams loom as the true architects of the fortunes of nations.

The President of the United States, Zinovieff, General Hauschildt, Lord Melton—these men are in the foreground and would have been written down in the older histories as the protagonists of the war that changed history. But in reality they were little more than eminently correct and proper marionettes, who played their parts as leaders unconscious of the strings that controlled their actions. If Bob Adams in the background had pulled another set of strings, they would have played other

roles equally well. Their calculations were forever being upset by some scientist in a garret (himself perhaps the puppet of higher forces) injecting a new element into the arts of politics and war.

To us today, it similarly seems that the heroes of the previous war (that of 1914) were not Foch and Hindenburg, Tirpitz and Allenby, but the obscure Austrian captain who invented the torpedo, the singular British archaeologist who roused the Arabs and the literary colonel whose mind gave birth to the tank. The scientific age had come to the world, and whether the science made war with mechanics, ballistics or psychology, it could be answered only by science. Military skill from 1914 on became no more important than skill at chess. Only now do we realize that the great men of those days were often very small and that we must search among the laboratory workers and technicians to find the true arbiters of destiny.

The intrusion of such a lay figure as Jim Blunt into a narrative dealing with basic causes needs, perhaps, some apology. Blunt gave the Wagstaff to the world; he ultimately rose to the president's chair in a great industry and a seat in the Senate of the United States (where he was distinguished for the grave emptiness of his every utterance) but he remained throughout one of those men who is controlled by, rather than controlling, events. The justification for his admission to these pages lies in the act that he was the connecting link between Stensoff and Hamilton, even as Abe Epstein was the connecting link between Adams and Stensoff.

In this way, we have carried the narrative down to the first use of the Adams Ray in actual warfare and the delivery of the first Wagstaff (as the ornithopter on which Hamilton worked came to be called) to the American authorities. These occurrences were nearly contemporaneous in time.

From this point on our story can be no longer one of interior causes. Our prime movers have passed from the stage. Robert Adams was not to come from the sanitarium in Michigan where he had been taken for some time, when he emerged as a middle-aged man to find himself famous in a world that bore little relation to the one he had known. Hamilton was dead; Epstein lost to sight; Jim Blunt, on recovering his health after a doubtful battle with the effects of the ray to which he had been subjected, became an instructor in and constructor of the machines he had brought to prominence. Stensoff was pursuing his usual tortuous and mole-like course in the background of Soviet diplomacy but he had unleased the whirlwind and men of action rather than of thought were required to guide it. He appears only once more in history, as a partizan leader in the Lake Baikal region following the fall of Tula. Then he too is lost to sight forever.

But the snowball had started rolling down the hill, gathering more and ever more consequences to itself. If Stensoff and Hamilton, Bob Adams and Jim Blunt no longer hold our interest from the historical point of view (for they affect the course of history no more), we must at least show the working out of the chain of events they set in motion, for only by this means can we tell how the stage was cleared for the next set of actors. It is incumbent upon the historian to show not only incident and character but the milieu in which they operated. For world conditions following the War of the Northern Alliance were so different from those preceding it that some description of that conflict is necessary if only to show the state of affairs under which the following generation of scientists had to work.

CHAPTER I

The Hounds Are Unleashed

(Time—1932)

THE defect of the science of the early years of the twentieth century lay in emphasizing the mechanical at the expense of the psychological—or perhaps we should call it the moral. Science had taught its children to walk without teaching them where to walk, and stood for a moment, helpless, while they walked to the edge of an abyss. With the discovery of the airplane, of high explosives and of poisonous gases, it had placed tremendous forces at the disposal of whoever cared to make use of them and (to change the figure) like a man who presents an idiot with a revolver, stood in danger of being annihilated by its own gifts.

The opportunity seized by Stensoff lay within the reach of any leader of his day. He was merely the child of the age—the scientific age; who had added a knowledge of the power of modern weapons to the ability and moral obliquity of a politician of the old school.

But to Stensoff, Commissar of the Eschgan, his actions did not seem those of moral obliquity. He was dominated by a single idea—that of a workers' civilization, in which the proletariat should be not merely the ruling, but the only force. He believed that even the arts and sciences of the older nations were tainted with a subtle capitalistic poison and contemplated nothing less than the destruction of the whole edifice, which he regarded as too rotten to endure.

All Russia was with him in believing that the condition which allowed the Soviet to exist beside the "capitalist nations" was one of unstable equilibrium. All Russia regarded a conflict as inevitable, and agreed with Stensoff that it would be a holy war in which any means would be justifiable.

But Stensoff went beyond this. He was aiming at destruction; he realized that a war conducted under the old forms and courtesies would place the odds against his country, and he had grasped the immense power of modern weapons for striking a sudden and crushing blow.

As head of the Eschgan (the War Preparations

Committee) he had planned for the blow to be struck at a moment of his own choosing, when he had first made use of every factor in the Soviet's favor. His plans had a grand sweep. The Communists of the world were to gather in certain cities and there foment labor agitation of all types, ending in vast strikes wherever they could be brought about. At the time of the strikes (the labor agitators knew just this much of his plan and no more) a certain few implicitly trusted by Moscow, were assigned for "direct action" consisting of sabotage, tieing up means of transport, bombing government buildings and officials.

Simultaneously a propaganda drive of an intensity never seen before was to be launched. The workers of the world were to be urged to rise against their "oppressors" and disaffected elements in all countries (the Tyrol, Sicily, the Phillippines, Ireland, for instance) were to be persuaded and helped in the direction of armed rebellion.

When these ferments had worked to the proper point, Stensoff was to launch his great blow. The Soviet was to begin the war by attacking the capitals of the larger countries on the same day and by the same means—squadrons of aeroplanes rising from apparently innocent merchant ships in a time of profound peace and unsuspicion, loaded with gas and incendiary bombs for the purpose of destroying every living thing in the selected cities. With the governments of the world thus disorganized and paralyzed, Stensoff counted not unjustly on pouring the Soviet armies over Europe and America, with little opposition, nay even with the aid of the insurgent elements he had roused.

Fortunately for the world the blow had to be struck before preparations were complete. The escape of Robert Adams and the sure knowledge that the Adams Ray in the hands of the American government, would render these wide-reaching plans abortive by demoding the then-known weapons of war, made it necessary for Stensoff to launch his thunderbolt before the ray could be produced in appreciable quantity. The highest tribute to his acumen is that the blow came perilously near to success, prematurely though it was delivered.

The very confusion of the existing records of that time is the best proof of how successful was Stensoff's plan. In America, as we know, Washington was utterly destroyed, with the Congress of the United States, the President and all the members of his Cabinet with the exception of Admiral de Roebeck, the acting Secretary of the Navy who, seriously injured as he was, found himself suddenly elevated to the presidency. Hundreds of people perished in New York where the direct action committees bombed the subways and many buildings and made a strong effort to seize the city. Chicago, Boston, Philadelphia and Detroit were the scenes of violent street fighting; there was a railroad strike and St. Louis and San Francisco had disastrous race riots to face.

In Europe, the Irish Republic was proclaimed and a Republican air force bombed Liverpool out of existence. The ship workers of the Clyde and the miners of Cornwall attempted to organize Soviets, and the hills of Scotland rang with battle. In France and Spain there were obscure and savage social wars. Paris was half-ruined by the few Soviet bombers that reached it and Communists and Whites waged a wolf-like conflict among the ruins. Berlin blazed to the skies under the impact of the Russian bombs, and the Rumanian peasants joined the Soviet armies in their march on Bucharest.

Only in Italy, where it was least expected, did Stensoff's first effort meet with complete failure. Mussolini gripped the Tyrol with an iron hand and extinguished the Sicilian troubles in a stream of blood. Engine trouble delayed the ship that carried the Soviet bombers destined for Rome. They attempted to fly the longer distance from a point near Naples and were met by an Italian air squadron. The Italians appear to have mistaken them for a French air squadron from Morocco, and were bent on escorting them to Rome. The Russian air commander lost his head and opened fire on them; the Italians promptly summoned help by radio, and being light fighting planes, speedily shot every one of the heavily-laden bombers into the sea.

In Constantinople and Angora a Jihad was preached and a Moslem army joined the Egyptian insurgents that swept the British out of the valley of the Nile and the French out of Syria. India burst into smouldering revolt and black armies with Russian leaders began a devastating guerilla warfare in South Africa.

This is the thing in its main outlines. All the details are not now known and may never be known. The individual was lost in the mass; men who seemed fit to last against the ages disappeared, crushed by the press of events, or killed in the world-wide fighting. A wholly new generation of leaders took over the conduct of affairs, a generation that came to regard war as the natural state and peace as something almost unattainable.

Money and property lost, to a degree, their old significance. A curious anecdote floats on the surface of history, illustrating the completeness of the general overturn. A reporter for the Chicago newspaper, in the year after the war ended, recognized in the room clerk of a cheap lodging house a former governor of the state, famous for the huge fortune he had amassed and the skill with which he had avoided legal prosecution for his immense peculations. It appeared that he still possessed the money!

CHAPTER II

The Clash of Arms

(Time—1932)

STENSOFF saw the first Red armies leave Moscow for the frontiers, and then retired to his cabinet to direct the service of supply. His work was done; at least so much of it as en-

titles him to a place in so general a history as this.

In the new Baltic states the Soviets won quick and facile success. Already half communistic, the change was one of name only for these countries. Their governments became units in the federal system of Soviet Republics, their armies portions of the Red forces. Rumania also came in on the Red side. Communists joined with leaders of the peasant party to secure the person of young King Mihail by a surprise raid on his summer palace at Cetate Alba, and though the great Bratianu family made a gallant struggle, the ground had been cut from under their feet. Turkey, long since secretly allied with Moscow, now stood openly in arms by the side of the Reds.

Only in Poland was there a check. Stensoff had counted on the radicals there to effect such an overturn as they had in Rumania, but with the appearance of the Russian armies at the frontier the radical party disappeared. There was left only the remembrance of a thousand wrongs and that fierce light of Polish nationalism which always burns brightest in dark places.

The Russian army, unsuspicious of resistance, had merely rolled forward in railroad trains. Three whole divisions had met at Kowel when a hasty, but well-planned Polish attack was delivered. It wiped out the vanguard to a man before Bourdakoff, the Red commander, realized that the Poles meant to fight. He made a disastrous retreat to Kiev, calling frantically upon Rumanian and Lithuanian forces for aid.

When he fought his way across the borders again, he found himself committed to a warfare of extermination. His men were ambushed from every house and stabbed in the back at night to such an extent that almost as many perished in this hole-and-corner conflict as in the fighting at the front.

But as the pressure of the Russian armies, aided by Rumanian and Lithuanian blows from the flanks began to tell, Bourdakoff gained. He was aided powerfully by the resource the Reds adopted all through the early part of the war whenever they faced stiff resistance—huge quantities of poison gas. The Poles had gone to war relying on artillery, machine guns and men, and this constant gassing which wiped out every human being, soldier or civilian, in the path of the Red armies, left them shaken and unsettled.

Phosgene and the new and deadly "Gas Alpha," a product of the Soviet laboratories, appear to have been used in about equal quantities. The former attacked the lungs, producing intense agony and a lingering death. It was a legacy from the war of 1914. "Gas Alpha" was a solid at low temperatures, passing into the air from the shells that contained it in so finely divided a state as to be capable of entering any gas mask then known.

It produced violent sneezing, often forcing the victim to take off his gas mask, and thus exposing him to the effects of the quick-acting phosgene. Those who inhaled this compound and died at once were fortunate. The new gas produced little direct effect other than sneezing the first day. On the second, signs of putrefaction manifested themselves at every point where the individual had been touched by the gas, whether in the nasal passages or on the hands, and this living rot spread until the unfortunate who had been gassed literally melted away while still alive.

Behind clouds of these gases the Russian attack began to break up the Polish forces. Bourdakoff took Lublin and the Lithuanians took Bialystok in August; both armies joined before Warsaw early in September, and it seemed certain that the northern Red forces would sweep across Germany with the same ease that the southern armies were swinging up the valley of the Danube.

Before Warsaw the Reds met their second check. At the beginning of the war a comparatively small force under General Tolovieff had been detached from the Lithuanian forces to overrun East Prussia, the little island of Germany beyond the Vistula. The German governor of East Prussia was a veteran who had seen service with Mackensen in the Balkans in 1915 and with Ludendorff on the Western Front in 1917, named General Hauschildt. Under his inspiration the defence of East Prussia became one of the heroic passages of the war.

With the ruthless spirit of a soldier of that earlier era, he commandeered everything in the province; men and women, money, factories, materials and provisions. Even the children were set to work at light tasks in munitions factories. In fact he did on a more complete scale what Admiral de Roebuck brought about in America (though the latter probably drew his inspiration from Hauschildt)—turned the whole of East Prussia into an armed camp behind the thin curtain of troops he was able to send to the front while he drilled his raw battalions and mobilized his munitions factories.

Hauschildt was fortunate in having within his armed camp some of the best chemists of the age. Set to work on the problem of the Russian gases which were causing almost as much panic among the Germans as among the Poles, they finally produced "Tetra," a lithium compound analogous to sodium thiosulphate. It had the advantage of being gaseous while preserving hypo's power of absorbing chlorine. With this new compound the Red phosgene attacks were met at the threshold. It was only necessary to open so many cylinders of the new "Tetra" and the phosgene upon which the Reds depended was reduced to impotence without even the necessity of putting on gas masks.*

* Phosgene, a chlorine compound of the formula COCl, was much used in the War of 1914, following the general use of poisonous gases introduced by the French. It produced disabling effects in as small a concentration as one part to a hundred thousand in the air, and fatal effects when the atmosphere contained one part of it in 50,000. Sodium thiosulphate (the "hypo" of the old fashioned photography) was an integral element in all gas masks

Stormy Days

AS Hauschildt's shops began to get into operation, the Bolshevika found themselves faced by an enemy better organized, better provided with artillery and aeroplanes and immune to their most effective weapon. Tolovieff was hurled back from Koenigsberg, and the force of the German rebound carried their advance right through to Memel.

But the effect of Stensoff's first crushing blow against the enemies of the Red Republics was telling. Germany as a whole had been disorganized by the destruction of the heart of the government; there was little coordination between the Reich provisional government, the Poles and Hauschildt's gallant but isolated effort. Indeed, the latter had been left rather severely alone by a government all too glad to have a portion of its embarassing problems thus cared for. The result was that Hauschildt was taking Memel off at a tangent to the main field of the war while Bourdakoff was beating the Poles back into Warsaw. Hauschildt finally realized the situation and hurried back. His small but well-led and well supplied force drove in on the flank of the Soviets at Mlawa; there was a sharp battle and the Reds were not only halted but thrust back some fifty miles.

If he had come sooner Hauschildt might have rolled the whole Red army right up to the Carpathians. He was now running short on manpower, and the brilliant victory at Mlawa was his last. While he was beating Bourdakoff there, the German defences broke under the heavy forces Tolovieff hurred up in the east, and Hauschildt had to abandon his advance and throw himself into Koenigsberg. In November, after an epic defence, the old lion surrendered the city on terms.

He had managed to delay the Soviet capture of Warsaw by two months and that of Koenigsberg by an even longer period—and in those all-important months the Americans arrived with the first of the Adams Ray tubes, just as the Poles finally broke at Thorn and the conquering Reds poured through the gap toward Frankfort and Breslau. But for Hauschildt's valiant defence the Americans would have come too late, for Bourdakoff's army would have been on the Elbe, perhaps on the Rhine in two months, and in the present condition of France this would have meant all continental Europe in Red hands.

Defeated in the end the veteran of 1914 held the enemy till the German-Polish army from Dantzig, headed by the invincible Adams Ray tubes, fell on the Russian flank and lines of supply, halting their advance and finally turning it into a retreat. Nor will the world forget in the greater glory accorded to the unknown chemists who took away the terrors of gas warfare, that it was through Hauschildt's conscriptive measures they were set to work on the problem.

The Polish front was the main theater of the war, but it went on with equal vindictiveness south of the Erzgebirge where the Red armies were sweeping almost unchecked through the Balkan states that had resulted from the carving up of the old Austrian Empire. They succeeded in winning easy victories in Hungary, Rumania and Jugoslavia (following internal upheavals of so muddled a character that they defy the historian) but soon encountered strong Italian opposition.

Italy, the only nation that had not been paralyzed by the strikes and bombing raids, entered the war united and whole hearted, and its part was by no means small. Indeed, there is reason to believe that it was from Mussolini that the original suggestion for a conference at Munich came. That conference, as we all know today resulted in the binding together of England, Italy, the United States, Japan and the French Legitimists in what came to be known as the Northern Alliance.

A powerful Italian army was landed in Albania, and another struck through the mountains from Fiume. Both achieved considerable victories; the Russian gas tactics were not well adapted to mountain warfare, a species of combat for which the Italians were excellently prepared and equipped. By the middle of the summer Italy was talking of a new Roman Empire.

Then the blow fell. A huge Soviet air squadron, into which all the planes on the front had been ployed, started from the Soviet lines. Only two planes reached Rome (where they did considerable damage before being shot down) but the Italian general and divisional headquarters, of the location of which the Soviets seemed excellently informed, were visited by fleets. The whole directing force of the Italian army was blown to atoms; the new Roman Empire collapsed like a pricked balloon and the leaderless remnants of the Italian forces were left clinging desperately to the Adriatic coast line.

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of the period, due to its extraordinary property of reducing almost any poisonous gas to harmless compounds. Beside being a strong reducing agent, it has a powerful attraction for chlorine.

The formula for "Gas Alpha" has never been discovered. It was made under circumstances of the greatest secrecy in plants at Uralsk and Novgorod, and probably later at Helsingfors. The first two plants were blown up during the fighting in the later days of the war, and the Helsingfors plant, if its existence is not a legend, must have been destroyed when the Scandinavians sacked that city in 1934.

"Tetra" was an extremely complex gas involving lithium, one of the rare metals, closely allied to sodium and potassium. It was compressed to a liquid in the German workshops and carried in small cylinders, two or three of which were supplied to each platoon of troops. When a gas attack began (and though the Reds later abandoned phosgene for other gases, "Tetra" was found equally effective against all) one or two of these cylinders was opened. "Tetra" being a heavy gas, hung near the surface of the ground and speedily neutralized the poisonous gases. It had some effect against even "Gas Alpha," although the protective compound which was sprayed over all exposed surfaces from small metallic atomizers was found more useful as a neutralizer in the case of this weapon.

The names of the discoverers of both the protective compound and "Tetra" have been lost. Both are supposed to have perished in the fighting preceding the fall of Koenigsberg, and the records which would have revealed their names were lost when the Reds burned the devoted city.

It was simply the utilization by the Bolsheviks of another possibility of modern warfare; of which, being free from tradition and formula, they were able to take the fullest advantage. In the war of 1914 no general would have dared thus to concentrate his air force; all clung to the old formula of meeting the enemy effort at every point, oblivious of the fact that it was just by denuding one point to deliver a crushing blow at another that Napoleon won his victories.

The older type of generals overlooked the fact that one blow like this, despite the inevitable heavy losses, would make victory sure; and a blow delivered at one spot by the whole air force of a nation could hardly fail to overwhelm local defences, no matter how good.

CHAPTER III

The Ray in the Field

(Time—1933-1934)

WITH the entry of the Adams Ray into the conflict, the War of the Northern Alliance enters a new phase, the first sign of which is a Soviet retreat in Poland. The great breach in their front made by the first use of the ray tubes was quickly closed by the Soviets, but to no purpose; for the ray destroyed successive contingents of artillery as fast as they were pushed in. Eventually the rallying Poles struck into the Bolshevik flank; Bourdakoff was driven back to a line resting on Bialystok and Kowel before he could halt.

For a time the two armies faced each other here in a state of coma, the Allies unwilling to attack without more ray tubes, the Soviets feverishly building up a system of defence and experimenting with counter-ray devices.

As it was used on the battlefront the value of the Adams Ray became manifest. It could explode any type of ammunition up to a distance of something over seven miles. As the ray traversed the air with the speed of electrical waves, attempts to shell out ray installations from distances outside their range was futile. The shells were exploded in the air long before reaching their objective by one or two tubes out of each ray battery, assigned to direct their emanations up at a high angle for this purpose.

To counter this the Soviets brought out (in the spring of 1933) a heavy gun firing a solid shot from a distance of fifteen miles, but the difficulty of hitting any mark accurately at such a distance without aeroplane spotting soon proved inauperable.

And aeroplane spotting was eliminated by the Adams Ray; it was speedily found that the ray set gasoline afire at a distance of over two miles and decomposed it into various tars and gases at a somewhat longer range, thus bringing down any aeroplane that ventured within range of the tubes. This forced aeroplanes to a height of over 38,000 feet for safety—an altitude that rendered them useless for military purposes. Rocket planes, which were tried by both sides, were found even more vulnerable, and the Diesel aeroplane and balloon motor did not come in till near the end of the [illegible].

Attempts were made to sheath aeroplane motors, field guns and ammunition chambers in lead as a protection against the ray. These failed when it was found that the sheathing had to remain absolutely air tight, for the ether-borne rays penetrated the slightest interstice.

Later in the war the Soviets found it possible to use explosives to a limited extent by turning against their adversaries the very device upon which they so much depended. Lead sheathed shells were made in air-tight lead-lined rooms. These were placed in guns which allowed a spur to be pushed through the outer lead casing by means of a spring when the trigger was pulled. The ominpresent rays, entering the hole thus made, set off the driving charge and fired the gun. When the shell arrived at its objective, a concussion device pierced the bursting chamber of the shell in a similar manner and the ray set off the bursting charge.

This plan was never used to more than a limited extent. It was soon discovered that unless the driving charge in the shell were very small (thus giving low ranges) the soft lead sheath to the bursting charge was apt to be ruptured by the explosion of the driving charge, or pierced by the concussion, and the whole thing exploded in the gun with disastrous results. When this was remedied by giving the bursting chamber an additional steel sheath outside the lead coating, the concussion arrangement which should have pierced it could not be made to work. Eventually the arrangement had to be restricted to the firing of solid shot for small ranges, and thus the reign of gunpowder, begun at the battle of Creasy, came to an abrupt and inconsequential end.

Up to half a mile the Adams Ray was discovered to produce blindness and severe burns in those not protected against its effects, and at close distances (two or three hundred yards) it brought about instant death by decomposition of the nerve cells. The general rule seemed to be that the more volatile and delicate the substance the more powerfully it was affected by the Adams Ray.

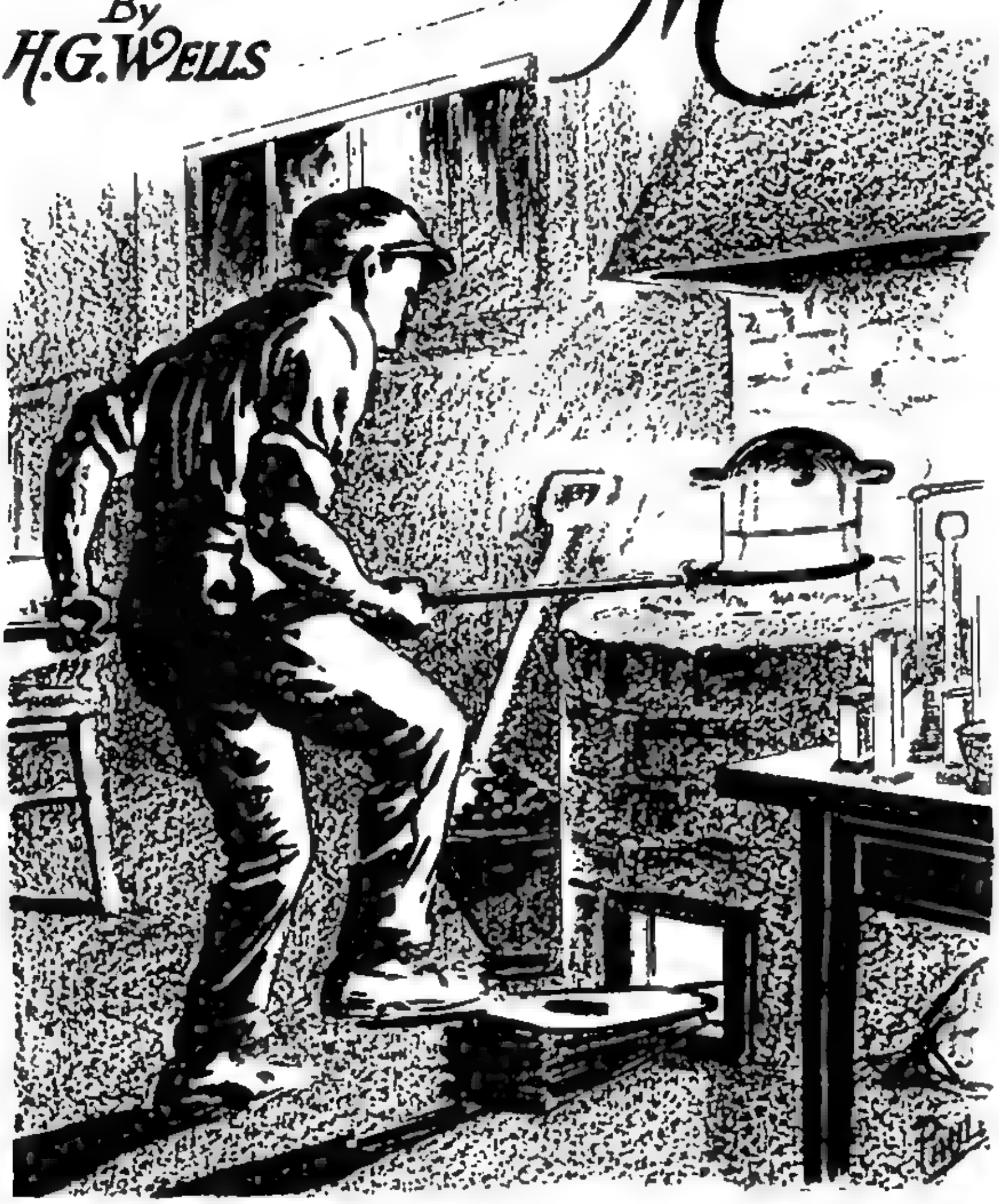
Back to the Middle Ages

DURING the summer of 1933 an ever-increasing quantity of these deadly tubes made themselves apparent on the battlefront, and small though the numbers of the Allied armies were, they were enabled to strike now here, now there, and drive the Bolshevik forces steadily before them. Vilna fell into their hands in August Kovno not long after, Riga and Petrograd in the early fall. In the south the Italians, heartened by the arrival of ray tubes and stiffened with German and Austrian forces, had again advanced and now continued the front across Europe in a long wavering line reaching through Tirana, Belgrade, Oradea Mare and Siret.

(*Continued on page* 81)

The Diamond Maker

By H. G. Wells



But I got nearer and nearer to the thing. At last, three weeks ago, I let the fire out. I took my cylinder and unscrewed it while it was still so hot that it punished my hands, and I scraped out the brittle mass with a chisel.

H. G. WELLS

SOME business had detained me in Chancery Lane until nine in the evening, and thereafter, having some inkling of a headache, I was disinclined either for entertainment or further work. So much of the sky, as the high cliffs of that narrow cañon of traffic left visible, spoke of a serene night, and I determined to make my way down to the Embankment, and rest my eyes and cool my head by watching the variegated lights upon the river. Beyond comparison the night is the best time for this place; a merciful darkness hides the dirt of the waters, and the lights of this transition age, red, glaring orange, gas yellow, and electric white, are set in shadowy outlines of every possible shade between gray and deep purple. Through the arches of Waterloo Bridge a hundred points of light mark the sweep of the Embankment, and above its parapet rise the towers of Westminster, warm gray against the starlight. The black river goes by with only a rare ripple breaking its silence, and disturbing the reflections of the lights that swim upon its surface.

A Strange Offer

"A warm night," said a voice at my side.

I turned my head, and saw the profile of a man who was leaning over the parapet beside me. It was a refined face, not unhandsome, though pinched and pale enough, and the coat collar turned up and pinned round the throat marked his status in life as sharply as a uniform. I felt I was committed to the price of a bed and breakfast if I answered him.

I looked at him curiously. Would he have anything to tell me worth the money, or was he the common incapable — incapable even of telling his own story? There was a quality of intelligence in his forehead and eyes, and a certain tremulousness in his nether lip that decided me.

"Very warm," said I; "but not too warm for us here."

"No," he said, still looking across the water, "it is pleasant enough here . . . just now."

"It is good," he continued after a pause, "to find anything so restful as this in London. After one has been fretting about business all day, about getting on, meeting obligations, and parrying dangers, I do not know what one would do if it were not for such pacific corners."

He spoke with long pauses between the sentences. "You must know a little of the irksome labor of the world, or you would not be here. But I doubt if you can be so brain weary and footsore as I am . . . Bah! Sometimes I doubt if the game is worth the candle. I feel inclined to throw the whole thing over—name, wealth, and position—and take to some modest trade. But I know if I abandoned my ambition—hardly as she uses me—I should have nothing but remorse left for the rest of my days."

He became silent. I looked at him in astonishment. If ever I saw a man hopelessly hard up it was the man in front of me. He was ragged and he was dirty, unshaven and unkempt; he looked as though he had been left in a dust-bin for a week. And he was talking to me of the irksome worries of a large business. I almost laughed outright. Either he was mad or playing a sorry jest on his own poverty.

"If high aims and high positions," said I, "have their drawbacks of hard work and anxiety, they have their compensations. Influence, the power of doing good, of assisting those weaker and poorer than ourselves; and there is even a certain gratification in display. . . ."

My banter under the circumstances was in very vile taste. I spoke on the spur of the contrast of his appearance and speech. I was sorry even while I was speaking.

He turned a haggard but very composed face upon me. Said he: "I forgot myself. Of course you would not understand."

He measured me for a moment. "No doubt it is very absurd. You will not believe me even when I tell you, so that it is fairly safe to tell you. And it will be a comfort to tell some one. I really have a big business in hand, a very big business. But there are troubles just now. The fact is . . . I make diamonds."

"I suppose," said I, "you are out of work just at present?"

"I am sick of being disbelieved," he said impatiently, and suddenly unbuttoning his wretched coat he pulled out a little canvas bag that was hanging by a cord round his neck. From this he produced a brown pebble. "I won-

IF there is one thing that we can predict with certainty during the coming century, it is the artificial manufacture of diamonds, which are composed mainly of carbon in a crystalline form.

Science has already made it possible to manufacture such priceless gems as rubies, emeralds and other stones. Rubies, as a matter of fact, can be manufactured synthetically today in a way that leaves nothing to be desired. Indeed it has happened in the past, that when real rubies and artificial ones were mixed together, the real ones could no longer be found or detected by any known means.

Years ago, the French scientist, Moissan, actually succeeded in making artificial diamonds. The only thing lacking was size, for these dimands were but of microscopic size.

In the present story, H. G. Wells makes use of this theme in a most original manner.

der if you know enough to know what that is?" He handed it to me.

Now, a year or so ago, I had occupied my leisure in taking a London science degree, so that I have a smattering of physics and mineralogy. The thing was not unlike an uncut diamond of the darker sort, though far too large, being almost as big as the top of my thumb. I took it, and saw it had the form of a regular octahedron, with the curved faces peculiar to the most precious of minerals. I took out my penknife and tried to scratch it—vainly. Leaning forward towards the gas-lamp, I tried the thing on my watch-glass, and scored a white line across that with the greatest ease.

I looked at my interlocutor with rising curiosity. "It certainly is rather like a diamond. But if so, it is a Behemoth of diamonds. Where did you get it?"

"I tell you I made it," he said. "Give it back to me."

He replaced it hastily and buttoned his jacket. "I will sell it you for one hundred pounds," he suddenly whispered eagerly.

With that my suspicions returned. The thing might, after all, be merely a lump of that almost equally hard substance, carborundum, with an accidental resemblance in shape to the diamond. Or if it was a diamond, how came he by it, and why should he offer it at a hundred pounds?

We looked into one another's eyes. He seemed eager, but honestly eager. At that moment I believed it was a diamond he was trying to sell. Yet I am a poor man, a hundred pounds would leave a visible gap in my fortunes, and no sane man would buy a diamond by gaslight from a ragged tramp on his personal warranty only. Still, a diamond that size conjured up a vision of many thousands of pounds. Then, thought I, such a stone could scarcely exist without being mentioned in every book on gems, and again I called to mind the stories of contraband and light-fingered Kaffirs at the Cape. I put the question of purchase on one side.

"How did you get it?" said I.

"I made it."

I had heard something of Moissan, but I knew his artificial diamonds were very small. I shook my head.

"You seem to know something of this kind of thing. I will tell you a little about myself. Perhaps then you may think better of the purchase." He turned round with his back to the river, and put his hands in his pockets. He sighed. "I know you will not believe me."

"Diamonds," he began—and as he spoke his voice lost its faint flavor of the tramp and assumed something of the easy tone of an educated man—"are to be made by throwing carbon out of combination in a suitable flux and under a suitable pressure; the carbon crystallizes out, not as black lead or charcoal powder, but as small diamonds. So much has been known to chemists for years, but no one yet has hit upon exactly the right flux in which to melt up the carbon, or exactly the right pressure for the best results. Consequently the diamonds made by chemists are small and dark, and worthless as jewels. Now I, you know, have given up my life to this problem—given my life to it.

"I began to work at the conditions of diamond making when I was seventeen, and now I am thirty-two. It seemed to me that it might take all the thought and energies of a man for ten years, or twenty years, but, even if it did, the game was still worth the candle. Suppose one to have at last just hit the right trick, before the secret got out and diamonds became as common as coal, one might realize millions. Millions!"

He paused and looked for my sympathy. His eyes shone hungrily. "To think," said he, "that I am on the verge of it all, and here!"

The Stranger's Story

"I had," he proceeded, "about a thousand pounds when I was twenty-one, and this, I thought, eked out by a little teaching, would keep my researches going. A year or two was spent in study, at Berlin chiefly, and then I continued on my own account. The trouble was the secrecy. You see, if once I had let out what I was doing, other men might have been spurred on by my belief in the practicability of the idea; and I do not pretend to be such a genius as to have been sure of coming in first, in the case of a race for the discovery. And you see it was important that if I really meant to make a pile, people should not know it was an artificial process and capable of turning out diamonds by the ton. So I had to work all alone.

"At first I had a little laboratory, but as my resources began to run out I had to conduct my experiments in a wretched unfurnished room in Kentish Town, where I slept at last on a straw mattress on the floor among all my apparatus. The money simply flowed away. I grudged myself everything except scientific appliances. I tried to keep things going by a little teaching. But I am not a very good teacher, and I have no university degree, nor very much education except in chemistry, and I found I had to give a lot of time and labor for precious little money. But I got nearer and nearer the thing. Three years ago I settled the problem of the composition of the flux, and got near the pressure by putting this flux of mine and a certain carbon composition into a closed-up gun barrel, filling up with water, sealed tightly, and heating."

He paused.

"Rather risky," said I.

"Yes. It burst, and smashed all my windows and a lot of my apparatus; but I got a kind of diamond powder nevertheless. Following out the problem of getting a big pressure upon the molten mixture from which the things were to crystallize, I hit upon some researches of Daubrée's at the *Paris Laboratorie des Poudres et Salpêtres.* He ex-

ploded dynamite in a tightly screwed steel cylinder, too strong to burst, and I found he could crush rocks into a muck not unlike the South African bed in which diamonds are found. It was a tremendous strain on my resources, but I got a steel cylinder made for my purpose after his pattern. I put in all my stuff and my explosives, built up a fire in my furnace, put the whole concern in, and—went out for a walk."

I could not help laughing at his matter-of-fact manner. "Did you not think it would blow up the house? Were there other people in the place?"

"It was in the interest of science," he said ultimately. "There was a costermonger family on the floor below, a begging letter writer in the room behind mine, and two flower women were upstairs. Perhaps it was a bit thoughtless. But possibly some of them were out.

"When I came back the thing was just where I left it, among the white hot coals. The explosive hadn't burst the case. And then I had a problem to face. You know time is an important element in crystallization. If you hurry the process the crystals are small—it is only by prolonged standing that they grow to any size. I resolved to let this apparatus cool for two years, letting the temperature go down slowly during that time. And I was now quite out of money; and with a big fire and the rent of my room, as well as my hunger to satisfy, I had scarcely a penny in the world.

"I can hardly tell you all the shifts I was put to while I was making the diamonds. I have sold newspapers, held horses, opened cab doors. For many weeks I addressed envelopes. I had a place as assistant to a man who owned a barrow, and used to call down one side of the road while he called down the other. Once for a week I had absolutely nothing to do, and I begged. What a week that was! One day the fire was going out and I had eaten nothing all day, and a little chap taking his girl out, gave me sixpence—to show off. Thank heaven for vanity! How the fish-shops smelt! But I went and spent it all on coals, and had the furnace bright red again, and then—— Well, hunger makes a fool of a man.

"At last, three weeks ago, I let the fire out. I took my cylinder and unscrewed it while it was still so hot that it punished my hands, and I scraped out the crumbling lava-like mass with a chisel, and hammered it into a powder upon an iron plate. And I found three big diamonds and five small ones. As I sat on the floor hammering, my door opened, and my neighbor, the begging letter writer, came in. He was drunk—as he usually is.

"'Nerchist,' said he.

"'You're drunk,' said I.

"'Structive scoundrel,' said he.

"'Go to your father,' said I, meaning the Father of Lies.

"'Never you mind,' said he, and gave me a cunning wink, and hiccoughed, and, leaning up against the door, with his other eye against the door-post, began to babble of how he had been prying in my room, and how he had gone to the police that morning, and how they had taken down everything he had to say—'siffiwas a' ge'm,' said he. Then I suddenly realized I was in a hole. Either I should have to tell these police my little secret, and get the whole thing blown upon, or be lagged as an Anarchist. So I went up to my neighbor and took him by the collar, and rolled him about a bit, and then I gathered up my diamonds and cleared out. The evening newspapers called my den the Kentish Town Bomb Factory. And now I cannot part with the things for love or money.

"If I go in to respectable jewellers they ask me to wait, and go and whisper to a clerk to fetch a policeman, and then I say I cannot wait. And I found out a receiver of stolen goods, and he simply stuck to the one I gave him and told me to prosecute if I wanted it back. I am going about now with several hundred thousand pounds' worth of diamonds round my neck, and without either food or shelter. You are the first person I have taken into my confidence. But I like your face and I am hard-driven."

He looked into my eyes.

"It would be madness," said I, "for me to buy a diamond under the circumstances. Besides, I do not carry hundreds of pounds about in my pocket. Yet I more than half believe your story. I will, if you like, do this: come to my office tomorrow . . ."

"You think I am a thief!" said he keenly. "You will tell the police. I am not coming into a trap."

"Somehow I am assured you are no thief. Here is my card. Take that, anyhow. You need not come to any appointment. Come when you will."

He took the card, and an earnest of my goodwill.

"Think better of it and come," said I.

He shook his head doubtfully. "I will pay back your half-crown with interest some day—such interest as will amaze you," said he. "Anyhow, you will keep the secret? . . . Don't follow me."

He crossed the road and went into the darkness toward the little steps under the archway leading into Essex Street, and I let him go. And that was the last I ever saw of him.

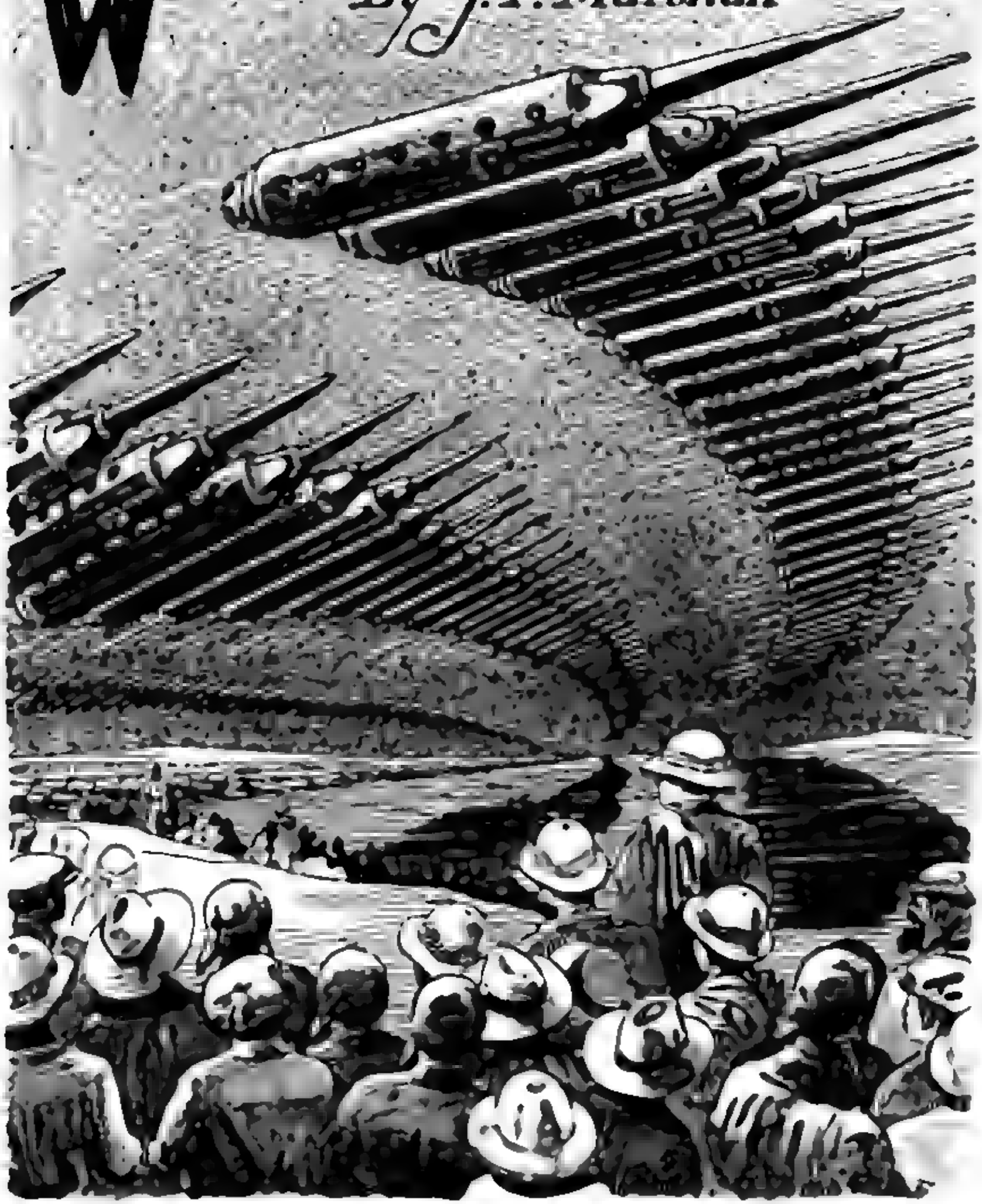
Afterwards I had two letters from him asking me to send bank-notes—not cheques—to certain addresses. I weighed the matter over, and took what I conceived to be the wisest course. Once he called upon me when I was out. My urchin described him as a very thin, dirty, and ragged man, with a dreadful cough. He left no message. That was the finish of him so far as my story goes. I wonder sometimes what has become of him.

Was he an ingenious monomaniac, or a fraudulent dealer in pebbles, or has he really made diamonds as he asserted? The latter is just sufficiently credible to make me think at times that I have missed the most brilliant opportunity of my life. He may, of course, be dead, and his diamonds

(*Continued on page* 83)

Warriors of Space

By J. P. Marshall



One by one the ships went fast sank to the air. Rising midstream half a mile up the column took form, one hundred men abreast, two hundred deep. Awed by the sight the spectators stood in the shadow that lay over the dome like some huge carpet of doom.

CHAPTER I

After Thirty Years

PROFESSOR Arthur Maynard roused himself from his abstraction as the sound of light laughter came to him from the hallway. A girl in tennis togs stepped into the library, closely followed by a tall young man of twenty - six years.

JAMES P. MARSHALL

Louise Leighton was a near neighbor of the professor! Nearly two years before her family had come to occupy the estate bordering his own, and for fully half that time he had been aware of the growing affection of his son for his fair neighbor.

"Oh, Professor!" laughter danced in the blue eyes of the girl as she shook back her closely shingled hair, "look out for Donald! He's seething!"

"Hello, Dad. Louise gave me an awful trimming. I didn't get a look-in all afternoon. I wouldn't let her go home. She must have dinner with us. We're starved! How long have we to wait?"

The flow of light talk came to an abrupt halt as Donald Maynard noticed the drawn features of his father.

"What is it, Dad," he asked, instantly concerned, "is anything wrong?"

By way of answer, the professor handed him a telegram dated at Washington. The message was short:

"Green globes seen near Pacific coast this morning. Details later. Be ready to confer with War Science office tomorrow."

Donald's dark eyes narrowed as he looked up again. "Well?" he asked.

"Have you seen the afternoon papers?"

"No. What——?"

The professor handed him a newspaper from a nearby table. The scare heads ran the full width of the sheet. Donald turned so that the girl too could read:

GREEN GLOBES AGAIN MENACE THE EARTH.

And below:

"The liner Centurion, due at Seattle on Wednesday of this week, reports by radio that several large green globes were seen early this morning, hovering low over the Pacific near latitude 44 degrees north, longtitude 154 degrees west.

"The startling report of the liner will recall to many the terror of the first visitation of one of these weird craft when it appeared over New York City thirty years ago last month.

"On the afternoon of July 26, 19—, a single globe about a hundred and fifty feet in diameter, was noticed floating over the city. On the evening of the same day it sent out a most pecular green ray that practically wrecked the original Bartholdi statue of Liberty. Two old style bombing planes that attempted to shoot down the strange object were themselves destroyed by the ray which seemed to have the power to reduce to nothing any substance that it touched.

"On the following day the globe landed in Times Square. By means of a sort of telepathic form of communication, its commander made it known that he was from Dione, a satellite of Saturn, and he demanded the unconditional surrender of the country within three days.

"A squad of police machine gunners, who attempted to prevent the departure of the globe, also became victims of the ray, being entirely consumed except for several articles of gold that they had on their persons.

"The entire country was gripped by the terror of the thing. The military, naval and air forces were at once mobilized toward the scene of the disturbance, but it was evident that the weapons at hand could not cope with that ray of destruction.

"In an effort to discover some new means of defense, prominent astronomers and scientists of the day were consulted, and after some discussion a young scientist by the name of Arthur Maynard came forward with the startling suggestion that since gold was the only substance that resisted the ray, men should be armored with gold, and armed with golden mirrors to turn back the ray on the enemy craft.

"The result is a matter of known history! After visiting the other nations of the world, and demanding the same unconditional surrender, the globe returned to New York for America's answer. During the brief battle that ensued, fifteen battle planes and a huge dreadnaught were utterly destroyed, as were also many of New York's proudest skyscrapers in the vicinity of Times Square.

"Twenty - four gold armored men, led by the young scientist himself, made a last stand in the middle of the ruined square. Bravely facing the terror of that globe they turned their golden mirrors upward and reflected the destroying rays back at their projector, consuming the globe itself in the same man-

THE well-known author of this story steps forward with a most astounding adventure that we know will leave a deep impression upon every reader of this magazine. It is a tale fit to be read, not once, but a number of times.

The author has developed so many new scientific ideas, in such an original manner, that the story fairly takes your breath away.

The method of attacking alien space flyers is certainly as new as it is original.

We hope soon to publish further stories by Mr. Marshall. His interplanetarian exploits stand in a class by themselves, and for sheer daring command respect.

ner that it had destroyed its victims.

"The scientist, Arthur Maynard, now Professor Maynard of Long Island, has always maintained that other globes would appear some day. He has devoted his entire life to the development of weapons that would place this earth in a position to successfully combat any such future attack. From time to time huge sums of money have been advanced by the Congress of United States to further his efforts and experiments, some of which have only recently startled the world.

"At the time of going to press, Professor Maynard had not made any statement, although he appeared calm when interviewed by our correspondent."

Rapidly Donald Maynard ran his eyes over the lesser column headings:

"NATIONS RUSH DELEGATES TO INTERNATIONAL DEFENCE CONFERENCE!"

"MAYNARD'S GRAVITY DEFYING SPACE CAR MAY BE OUR ONLY USEFUL WEAPON!"

"WILL PROFESSOR MAYNARD SAVE THE EARTH FOR A SECOND TIME?"

Donad felt the girl's hand tighten on his arm, while the muscles around his heart seemed to contract with a nameless dread. He straightened and regarded his father seriously.

"What will it mean?" he asked.

The professor slowly raised his eyes to the others. New lines were growing on his face with each passing minute as he realized the tremendous responsibility that was his.

"May God help us," he whispered. "It means war! War between two worlds. War to the destruction of one or the other! It can be no less!"

CHAPTER II

A Call in the Night

TWO o'clock in the morning. San Francisco slumbered.

Far out beyond the Golden Gate ten round luminous objects drifted along easily at a height of a mile or so above the water, like a string of heavenly pearls. Four muffled strokes of a ship's clock chimed softly over the harbor, and from somewhere came a voice:

"Four bells, and all's we—— Eeee-ahh! Turn out! Turn out! The globes are here!"

A ship's siren split the darkness. Another took up the call, the long rising wail of a fire-boat joining in the din as it rushed from its dock to investigate the disturbance. On shore a hoarse throat of brass shrieked out a tattoo of sound—a riot call! In less than two minutes after that first startled cry of the watch, it seemed that every whistle on harbor and shore was calling its warning.

For two days, the whole country, the Pacific Coast in particular, had been waiting, fearing to hear those warning signals. The terror of the unknown does not die quickly. Even after thirty years there were those who remembered the fate of proud New York, and remembering, their one thought was to escape.

From the houses rushed the populace of the city to look and then run back to gather what few belongings they could carry. The streets became clogged with the exodus of automobiles. Speed laws went by the board as each driver grimly determined to get away from the danger zone.

The great Pacific Broadcast Station, just signing off its small-hour concert, bade its listeners to stand by; then out over the whole land went the warning. The government station at Arlington heard, and shot the news to Washington. The capitol leaped into action. Army, navy, and war science departments became alive, humming with activity, and as a final step the radiophone of the War Science Building beat out the signal:

1PAM. 1PAM.

Tuned to the wave, the receiver in Professor Maynard's library picked up the call.

1PAM! 1PAM! It roared through the house.

Young Donald Maynard was the first to reach the control panel. Grasping a dressing gown as he ran from his room, he took the stairs three at a jump, and threw over the control.

"1PAM answering; Donald Maynard speaking. What is it?"

"Your father, we want your father!"

Donald surrendered the instrument to the elder

"Yes, what is it?"

"Ten globes coming in over the Golden Gate at two o'clock. San Francisco may need help. What do you advise?"

Back in the War Science Building a bewildered operator raised his eyes to his superior.

"Well," the latter barked impatiently, "what did he say?"

"He said—He said he'd go right over. Be there in ten minutes or less—and then he cut off."

PROFESSOR MAYNARD turned from the radiophone, and with a speed belieing his sixty years, ran for the side door of the library.

"The car, Donald, the car," he called over his shoulder. "Don't stop to dress. Come!"

Out through a connecting passage, past an alert guard into a spacious hangar, ran the scientist, his son trailing close behind, the dressing gown still hanging over one arm. The guard wheeled to press a button. A gong filled the interior of the hangar with its din.

"The doors!"

Across the Continent

Evidently trained for just such an emergency, several men sprang to the doors swinging them wide before the bulky object that filled the hangar; the thing that the newspaper had called Professor Maynard's gravity defying space car.

In appearance the car looked like a huge overgrown steel-jacketed bullet, painted black, its nose running down to a stubby needle-pointed ram. Reaching an opening in its smooth surface,

the scientist clambered inside. Donald had hardly followed suit when two others swung themselves in and clanged the shutters closed behind them.

Each knew his place. The professor climbed into a chair well forward in the craft, facing an array of controls that looked more like the keyboard of a pipe-organ than anything else. Hastily he drew about him the straps of a harness attached to the chair, and pulled the last buckle tight.

Donald stationed himself before a calculating machine above which hung a panel of meters and instruments, while the other two men busied themselves at a switchboard well aft.

A subdued hum sounded from a bank of transformers as one of the men threw a switch. Then came the drone of a fan—and a wave of fresh oxygen blew through the car.

Around the entire curve of the walls were vacuum tube settings, each holding a tube about the size of a small keg. Around each tube a lead shield was erected, completely surrounding the tube except for a cone shaped opening in each which pointed toward the outer walls of the car.

The professor raised his eyes to study an astronomical chart hanging above him, then he depressed a key. A tube glowed softly within its lead housing. Then like a bit of thistle down the car rose into the air a few inches and remained suspended. The professor lifted his hand.

"Watch out! No time to take it easy!"

His hand fell, but not before the other three had grabbed wildly at the nearest stanchions. Three keys moved under the professor's fingers; three more tubes glowed with life, and the car shot from the hangar in a steep arc that pointed its sharp nose up at an angle of over forty-five degrees.

"Throw on the floor tube, Henry," the professor suggested, "we're going straight up!"

The man named Henry shot home another switch, while the occupants of the car breathed easier, and let go their holds on the trusses. The professor's hand moved again. The car tilted until its nose pointed straight up away from the earth.

Seemingly the three men who were standing should have been pitched into the lower end as the car tilted, but quite easily they trod the floor gratings, as if the car were resting on an even keel.

The explanation of this was what had startled the world less than two months before, when the professor had first made public the news of his success. The public, inured to modern miracles, had been willing to concede that Professor Maynard's six element tubes could reverse the pull of gravity in one direction and amplify it in another, and so give the car its motive power. But it had seemed all but impossible that the energy of one of those tubes could be so directed that the floor of the car became a separate plane of gravity that could draw objects to it as the earth did.

"How high, Dad?" Donald asked, looking at his father.

"About fifteen miles, Don. High enough to get well above the atmosphere, and so get rid of the friction of the air, then we can begin to travel." He consulted the clock. "Twenty-five minutes of three! Not so bad, eh?" There was an exultant note in his voice.

Not more than thirty-five minutes had passed since that first siren had boomed its warning over the harbor of San Francisco. And yet in that space of time a nation had been warned, and across the continent help was speeding toward the city to guard it from the menace of the terrible visitors.

Donald was counting:

"Twelve, thirteen, fourteen, fourteen and a half, fifteen. Straighten out, Dad. Fifteen and a half, sixteen, fifteen and a half, fifteen. Hold it there!"

The keel of the craft had dipped to a position parallel to the earth. The professor again studied the chart over his head, and then depressed a round half-dozen of keys. The men had the queer feeling that the car was trying to slip out from beneath them. Gaining, gaining, accelerating its speed every second, the car shot westward.

"Position?" barked the professor.

Donald scanned his meters, then ran his fingers over the keys of the calculating machine.

"Earth's longtitude ninety-six degrees west, latitude forty degrees north," he announced. "Just passing over Kansas."

The professor pulled up two keys and depressed two others in their stead. "Position?" he called again, after a short wait.

"Longtitude one hundred and twenty, west; thirty-eight north," came the answer. Donald narrowly watched the instruments.

"Down!" he called.

The car checked its headlong flight. Its sharp nose dropped, and down through space it rushed toward the earth. The scientist's hands were fairly flying as he manipulated the keys to check that descent. A slight shiver ran through the craft as it struck the air blanket over the earth. After a few seconds the car levelled off again and hung poised while its navigator jerked open a wicket behind a heavy glass port.

Beneath them lay the lights of a great city. Out to the west rolled the open Pacific, and slightly to the north, almost at the same level as the car, floated ten shining globes.

"Two forty-three," growled the professor. "Eight minutes across the continent. Three thousand miles—and we didn't open up even half a notch. Well, we'll see what we can do."

CHAPTER III

The First Blow

BUT in the short length of time since the globes first drifted in over the harbor, San Francisco had suffered.

When first that Pacific liner had radioed the news of their presence in mid-ocean, the warning had been broadcast to all parts of the world to

allow the globes to come in peace if they would. No searching lights, no planes or aircraft guns had been turned against the visitors, and yet they had chosen the way of war. Dione must have bred a race of warriors whose only object in coming was to make a new conquest.

The globes had hardly reached a position over the city before they loosed that ray that was their weapon. From the globe nearest the city came a short green pencil of light. It lengthened, stretching down until it rested on the house-tops below. Some of the houses were merely seared, others had large sections conjured away as the ray touched only portions of them, but those on which the ray rested fairly seemed to melt into nothing. Absolutely nothing remained to mark where they had stood except a series of scarred craters with a light green mist that hung over them. The other nine globes had been quick to follow the example set by their leader. With no apparent objective they flashed their rays down to the buildings below, leaving patches of desolation wherever they touched.

It was not within the limits of human endurance to be subjected to such an attack for long without at least attempting a reprisal. But an attempt was all that it became. A squadron of planes winged out to the attack, and as on that night in July, thirty years before, the planes went to their destruction under the baneful green stream.

Then the space car arrived.

Peering through the port, the professor rapidly surveyed the situation. For the second time in his life he was facing these globes of death. Ever since that initial experience he had worked with but one thing in view: the time when the world would again be menaced by those weird craft. Even his son had been brought up with the idea, and he had made ready to take over the work at his father's death.

"Get straps!" The scientists voice was sharp with excitement. "Get straps and tie yourselves to the stanchions. Hurry! They've seen us—and we're going to carry the fight to the enemy."

Indeed they had been noticed! The globes suddenly shifted to re-form in a close circle.

"Ready!" Donald pulled the last strap tight.

"We have a weak point," the professor admitted grimly, all the others I am sure of excepting that one. Those glass ports! They are made of layer after layer of glass with ray filters of gold salts in between. If a ray touched them and they hold—well and good. If they give way——," he shrugged expressively.

His hand fell to the keyboard. The car moved forward, slowly at first, then gathering momentum it swept by the globes, speeding far to the north before it cut a wide circle and rushed back straight toward the center of that shining circle.

A single green ray shone from the nearest globe, creeping out toward that hurtling menace. The Dionians seemed unperturbed, evidently confident that nothing could withstand their weapon. Perhaps they believed themselves to be omnipotent.

The ray touched the side of the car, stripping its coat of paint from it like a vanishing cloak. A flash of green showed through the ports and passed on. The glass had held! From the ground the watchers saw their champion turn from a dull black to a shining gold, and a wild cheer burst from their throats. Gold! The car was plated with gold—and safe.

The steady onrush of the car was disconcerting to the invaders. The globes suddenly shifted, the circle tipping so that each globe could bring its rays to bear. Then the night sky fairly bristled with a barrage of green streamers.

Literally bathed in a sea of green light the car plunged on.

"Now—the mirrors! Straight ahead!"

In answer to that command, the man named Henry grasped a double set of control handles and spun them about. Outside the car, two golden mirrors flashed their bright faces forward. Green rays caught on polished gold and shot back toward their origin. Two globes dropped from sight—destroyed by their own weapon. Then the space car entered the circle.

Too late a globe dropped from the line. The car veered and struck!

Traveling at such a terrific speed, the spur crumpled through the side of the globe as if it were only paper, telescoping the whole craft over the front of the car. Still carrying the wreckage the car rose until the lights of the city became only a tiny blur, then it turned and dropped, suddenly checking its flight less than a mile above the bay.

Like an apple slung from a stick, the wrecked globe shot from the impaling spur, down, down, until it struck a mighty splash and the waters of the harbor closed over it.

"Three gone!"

Victory

THE scientist put his machine through the twist of a hairpin turn and headed back again. The seven remaining globes split into two groups, speeding apart until a wide gulf lay between them. In comical bewilderment the professor scratched his head.

"It's a trap," he burst out, "but how am I supposed to walk into it? We'll see."

He coasted up to a position midway between the groups and hung ther motionless.

But one tube glowed within its lead housing; the tube that robbed the car of its gravity. With that tube dead, the machine would become just an ordinary mass of metal, subject to all the power of the earth's attraction. The professor poised his hand over the controlling key and waited.

Suddenly the globes moved! The Dionians

flashed no rays now; they dared not after their late experience. From both sides they rushed toward the car, evidently intent on crushing their enemy between them. Their speed was unbelievable, fully as fast as the space car itself could travel; it would be only a matter of seconds before they struck. Nearer they came—nearer—

The professor's hand snapped up sharply. The glow died from that last tube, and the car, dropped, tumbling end over end as it fell toward the earth.

From above, in the space it had just quitted came a medley of metallic crashes, as the converging globes bumped not the enemy that they had thought to crush, but themselves. The professor laughed softly as he checked that headlong rush.

"They are not so clever, these men of Dione. How much damage did they do?"

Only three globes appeared in formation. Off to the west four others moved slowly out over the water. Perhaps somewhere in the Pacific they had an island base. The ocean was dotted with atolls, any one of which would serve their purpose.

The scientist clamped his jaws tightly.

"It's not nice," he ground out, "but it's war. We'll take the cripples first."

The car sped after the four limping globes which suddenly made a pitiful attempt to run for it—to no purpose. They met the same fate as had the third one. One by one the space car impaled them on that deadly spur, and shook them off into the Pacific. Turning for the last time the victorious men searched for the three that were yet to be reckoned with, but they were gone! Far down to the south, mounting higher as they fled, three glowing points of light were rapidly fading from sight.

A very weary scientist leaned heavily on the edge of his control board.

"Take the car, Donald; I've had enough," he breather. "It's almost three o'clock. "We'll go down to see the damage and then hurry home." He smiled wanly. "You know how angry it makes the cook when we are late for breakfast."

CHAPTER IV

Many Things Happen

TWO weeks passed by without any further sight of the globes. The lull in hostilities was not surprising. The invaders had been so badly beaten in their encounter with the space car that it was only natural for them to consider carefully before making a second attack. If the three surviving globes had returned to their planet with the news of their defeat, then of necessity some time would have to elapse before any further action could take place.

The wait did not delude the earthly powers. It had been thirty years since the last visitation, and then there had been but one globe which had been destroyed. The men of that far planet could not have known of the fate of that first craft. It had taken years, perhaps years of further experimentation, and perfection of their carrier before the second attempt was made. But this last time three had escaped to carry the news of their discovery. It could be only a question of time before the next move was made, and the conference of the nations could only conjecture how strong a force would next appear.

Plans and specifications of the space car had become world property. Each nation was building them as quickly as they could. Radio and cable lines became taxed to capacity with the rush of official communications. The world was in arms!

Donald saw but little of his father during those days. The professor had turned the care of the space car over to his son, while he devoted his whole time to the many conferences. The space car needed repairs. The bath of green rays had harmed it not at all, but the five globes that had met destruction on the point of the spur had left their marks.

The spur itself was built up of alternate layers of steel and gold. Foreseeing the difficulty that might arise if its soft outer covering became gouged by a collision, the professor had wisely constructed his ram so that such an occurrence would only cause him to lose a layer or two of the many that made up the spur. If that gold skin became broken, exposing the steel to a green ray, the ray would merely destroy the steel down as far as the next layer of gold, when its action would be checked.

Louise spent much of her time with Donald while he worked on the car. Often she too would don overalls and insist on helping him.

It was on the evening of the second of September that an incident happened to remind the world that they were by no means free from the attentions of their foe.

Donald was working late on the interior of the space car, Louise, as usual, assisting him. The huge hanger doors stood open wide, while outside paced the ever watchful sentries.

"Come, Donald," the girl leaned near to him, "you have worked hard all day. You must get a breath of air before you sleep, and—and I want you to walk with me." There was a wistful note in her last words. She had had so little of him for the past two weeks. She missed their former evening strolls under the stars.

Donald gathered his tools, and smiled down tenderly at her.

"Things are in pretty fair shape now. It shall be your evening. I'm sorry that things have been so, but you know——"

The girl laid her hand softly on his arm.

"Yes, Donald, I know. On your father and you rests so great a burden, and you can not shirk it. I would not try to make you, only you must keep fit and not over-work."

An Intruder

DONALD slipped lightly through the trap in the side of the car. It was dark in the hangar—and quiet. Only from outside came the tread of sentries.

In the far corner something moved!

"Is that you, Jack?" Donald called sharply.

No answer.

"Jack!"

"What is it, Donald?" the girl's voice from within the car called to him. "Watch out. I'm coming down!"

"No!" There was a nameless dread clutching at Donald's heart. **Something** was in that far corner of the hangar; something that moved and would not answer!

"Stay back, Louise," he shouted. "Wait until I call!" then louder, "Guard! Ho! guard. Inside the hanger; it's Donald calling!"

The sound of running feet came from outside. From the corner came a low musical hum, and a tiny thread of green cut its way through the dusk. Donald's heart leaped into his throat and he recognized the color.

"Something is the matter, Donald; I'm coming down."

Louise! in the rush of his fear for her, Donald forgot his own danger. He made a cat-like spring to one side, crooking his hand through the opening to spring the shutter catch.

"Stay there," he yelled.

The trap clanged shut. Louise would understand, and she would be safe inside.

That wandering thread of green touched the spot where he had been standing. Its tip moved along the side of the space car. Would the guard never come? There was no sound of running now. Had they been overpowered? Had that loyal little band of men met death at the hands of some confederate of the wielder of the green ray?

Donald cursed his stupidity in being unarmed. But then, who on earth could suspect such a form of attack? The tiny ray wandered back and forth. Donald crouched low, not daring to move lest he betray his position. Fascinated, his eyes followed the spot of light as it traveled now near, now far from him.

Suddenly a series of orange spurts leaped from the shadows around the doorway. A deafening roar filled the hangar,and through the crash of the rifles came a weird shrill scream.

A New Attack

THE lights flashed on. Blinking rapidly to accustom his eyes to the sudden change, Donald looked around him.

By the doors stood the members of the guard, poised, rifles ready—but there was no further need of them. In the corner lay the dwarfed figure of a man. Reaching him with a hasty sprint Donald turned the body over. It was fairly riddled with bullets. The man was dead.

Although short of stature, the dead man was heavy and muscular. There had been enormous strength in that squat body. The features too were cast in a strange pattern, even in death looking malignantly cruel.

"What does it mean, Mr. Donald?" the captain of the guard turned a grim face toward the young man. "We heard you call. We would have run in, but I thought better of it so we crept up quietly, and from the corner we saw that bit of green light coming." His jaw clamped suddenly. "Green isn't a popular color on this earth now—and I'm taking no chances. The professor's orders were to shoot first and talk afterward if anyone tried to bother the space car."

"You have done well, Captain, very well indeed!"

It was the voice of the scientist that spoke the words. He had come on the run, attracted by the sound of the firing. Donald gazed at his father wonderingly. On the night when they had conquered the ten globes he had known a new type of man for a father. This was still another who stood before him, eyes flashing, teeth clenched, an automatic swinging from either hand. The professor stooped.

"What's this?"

"Don't!" Donald's sudden cry stopped his father's fingers just short of a long metal cylinder that lay near the fallen man. "It's death, Dad; be careful. It holds the green ray!"

"The green ray? Here? Tell me quickly, what happened?"

Donald explained with a few word, "and Louise is still in the car," he ended.

"She is safe. Let her stay," grunted the other. "Don't let her see this. Captain, you take the body away and double the guard tonight." Again he turned to his son. "Let Louise out when they have gone, but don't tell her—the truth. Just tell her the guard shot and wounded a fellow who wandered into the hangar."

"But, dad," Donald's eyes bored into those of his father, "I'm not Louise, and you are holding back something. What is it?"

Gingerly the scientist stooped to pick up that metal cylinder.

"Think, Donald," he grated, "think! You have read the eye-witness accounts of thirty years ago, and this—this cylinder is the last bit of evidence, if it is needed. Do you thing that is any earth man whom the guard shot? Donald, that is a man from another planet! That is a man from Dione!"

In the quiet of his own room Donald sat smoking. An enemy spy in the hangar! Had he been alone or were there others about? What had been his object in coming? If there were others who could tell at what instant that ray of destruction would be turned on the house and its occupants?

Absently he gazed from the window of the darkened room up to the star strewn heavens. Up there, millions of miles away, was another world, a world peopled with a race that sought to conquer the earth.

A falling meteor cut its bright trail across the sky, arcing down toward the earth. Meteor? Before Donald could collect his scattered thoughts enough to realize the true significance of that speeding bit of brightness, it had grown, and it kept growing. With incredible speed it rushed down toward the house—a globe!

There was nothing that could be done. The knowledge tore through Donald's mind as he watched, fascinated. But before the thought could fairly register, the globe was past, skimming lightly through the air to come to rest in a field about half a mile from the house. Only a part of a minute elapsed before it moved again, cutting a long graceful curve as it rushed upward, growing smaller; now a mere pin point of light; then lost amid the myriads of stars.

Donald rubbed his eyes. It had been no hallucination, of that he was sure. But why——?

The household was astir early the next morning. Foot by foot the professor and his aides went over the grounds surrounding the hangar. Beneath a window they found footprints—the prints of two men. One set of prints coincided with the peculiar footwear of the dead spy, the other set, similar but smaller, milled around and became lost in the short grass. After breakfast a car arrived from the city bringing two bloodhounds. Their work was soon done.

For a few minutes the dogs sniffed noisily about the spot where the two sets of footprints showed in the ground, then turning, they led the way across the grounds, with the keeper and the others hastening after. For half a mile or so they strained ahead steadily. Suddenly they stopped. In widening circles the dogs beat about the field, only to return to where the men stood and start again.

Donald turned to look back toward the house. There could be no doubt! The place where the trail ended was also the place where that speeding globe had landed the night before.

"You were right, Dad," he conceded, "they came to pick up their spy. Was it prearranged or did he signal? I wonder if we will ever know?"

The afternoon was still young when the radio began to drone its signal: 1PAM. 1PAM.

An excited operator at Washington blurted out his news to the professor:

"Three globes rushed down at one-fifteen, hung low over the mint and turned loose the green rays. The mint is gone, entirely destroyed. The vaults gave way along with the rest leaving the ground covered with gold bullion. The globes landed, took on board all the gold they could carry and left again. I will call you if anything else happens." He signed off.

CHAPTER V

An Idea and a Confession

EVENTS were not long in shaping themselves after that surprising week-end. Donald seemed to have drawn into a shell from which he could hardly be dragged. Long hours he spent in the library. Other hours he spent covering sheet after sheet with figures. Even Louis failed to draw him from his abstraction.

"Don't misunderstand, please," he begged her. "I am trying to settle something in my own mind. I dare not tell even you until I am sure, lest you think that I am insane."

And because Louise was a woman, and in love, she patted his shoulder and told him she understood, even while she did not understand at all.

For a week he continued to hide himself away. Then one afternoon he called his father to him. Laying down the sheaf of papers he had been poring over, he looked up as the scientist entered the library.

"What is it, Donald?" he asked.

Donald's voice was small, like that of a frightened boy who proposes some madcap scheme:

"Dad, when first the globes appeared you said it meant war; war to the destruction of one or the other of the planets. You remember?"

The professor nodded. Donald continued.

"I—I hardly know how to begin. You may think I am mad, but here," he indicated the pack of papers, "here is the proof!"

For half an hour Donald talked, slowly at first, then as he warmed to his subject the words came in a torrent. Fired by his enthusiasm the scientist seized a pencil and himself covered many pages with figures and equations. The afternoon waned, and still they talked. Heads together, they went over sheet after sheet, checking and rechecking the results of their work. At last the professor pushed back his chair.

"My, my boy," he whispered, "what have you shown me? I am a scientist, Donald. I have trained myself to believe that which is supported by proof. But this! It is almost unbelievable, in spite of all proof. Still—it is the one real way to settle this warring of worlds."

For a long time after that he sat silent, slumped down in his chair, chin cupped in hand, while the shadows of evening gathered in the library. Again he raised his head, then slowly pulled himself from the chair to stand beside his son.

"I will call the powers, Donald, and you shall tell them of your plan, but you must not be disappointed if they reject it. Remember, my boy, it will be hard to make them believe. Even I, with all my knowledge and training, am staggered by the thought of what you propose. It will be your task to convince them."

Alone in the library, Donald turned on the desk light. His head sank forward to rest on his bended arms. Had it been only a few weeks before

when he had been so carefree? Then he had looked on his father's experiments and inventions as necessary steps toward some battle of the ages that would never take place in his time. And now! His head throbbed with a dull ache; the strain of the past week had been tremendous. And outside was the world, hanging breathless, waiting for the knowledge of its fate, while over it hung the dark shadow of that sinister star.

He did not hear the light footsteps behind him, did not notice the presence of the girl until she gently touched his shoulder.

"Donald!"

"Louise," he raised his eyes to meet the deep glow in her own. He felt the hand on his shoulder trembling, "Louise, what is it?" He stood up to face the girl.

A sob, half strangled in her attempt to control it, was her only answer.

"Tell me, dear," unconsciously the endearment slipped past his lips.

"Your father told me," she whispered, "and I am afraid for you."

Donald struggled to control his own emotion. Yes, it had been but a month since he and this girl were such happy companions. Then happiness had seemed near. With each passing day he had felt the urge grow stronger to tell her of his love; and then the globes had come!

Donald had aged. The month had hastened the usually slow transition from youth to manhood. With possible destruction hovering over the earth he had tried to put the thought of his own love from his mind, but now—time was short. If the powers accepted his plan he would go, perhaps to his death. Could he go without telling her? Was it fair to either of them to let the sweet confession unspoken?

"Father told you all? The whole plan?" he asked.

"Enough, Donald. Enough so that I know the danger toward which you are going. I—I want you to know——"

The clasp of his arms about her stopped her words.

"I do know, Louise, without being told, and you know, too, that I love you. I have wanted to tell you for so long. It would have been before now, dear, if the globes had not come. My father needed my help. The world needed us both. It would have been selfish of me to neglect them while I comforted my own heart.

"You spoke of risk. There will be—some! I will not try to give you a false sense of security by denying it. But, my dear, my risk will be no greater than would be the danger to the whole world if I do not make the attempt.

"You must be brave, sweetheart. If I succeed, all the earth will be safe for love and happiness, and then I will come to you and ask you to be my wife. If we fail——" He did not finish. Instead he leaned to find her lips.

Another sob shook the girl, but there were no tears in her shining eyes.

"You—you mustn't mind the sobs, Donald. I cannot hold them back. I would not keep you from doing your part, even if I could. I know—I know what success or failure means—but you must win." Her arms suddenly tightened around him.

"My man," she whispered, "mine! Death cannot take you from me. I will wait—through all eternity if need be." She met his lips again with a tremulous little sigh.

CHAPTER VI

The Conference

PROFESSOR MAYNARD'S call to the powers brought quick response. There was need of haste, for there was no knowing at what moment the enemy planet would strike again. To hasten the gathering of the legates the professor himself drove the space car in a circuit of the world to pick them up. There was another reason that led him to his act, aside from that need of haste. He wished the delegates to know from their own experience the wonder of the car. It would be one thing to describe Donald's plan of action to a group of men who knew only vaguely the carrier that would be used. It would be a much simpler matter to convince them after they had themselves ridden over the world in that craft.

With the stop-overs that were necessary it took a whole day to gather the assembly and bring them to the professor's Long Island estate. He brought more than statesmen. From the nations he gathered scientists, astronomers, physicists, and added them to the company.

"Dinner first!" the scientist exclaimed when all had disembarked from the car, "Not a word of business until after dinner."

The meal was a solemn affair, despite the efforts of the host to keep his guests in a cheerful frame of mind. The cigars passed, and amid an expectant hush the professor rose from his chair.

"Gentlemen, what I have to say will not take long. There is no need to rehearse the events of the past month, nor to point out to you the gravity of the situation, but we will do well to consider the most recent developments.

"We have found spies in our midst, spies who I have every reason to believe are actually men from Dione, a moon of Saturn. A mint of my country has been destroyed and its gold carried away. Why?

"I believe that those spies found out that gold is the substance of our defense. Perhaps on their own planet there is no such element as gold, at least they have troubled themselves to the extent of seizing a large amount of the metal to carry away.

"This last attack, on the mint was made by only three globes, the same number that survived the battle over San Francisco. Is it not reasonable

to suppose that those globes have been near the earth ever since the night of that battle? One of those globes dropped off spies to gather such information as they could, and later picked them up again. With that new information to go on they seized the largest store of gold that was available, and without doubt they have now carried that gold to their home planet.

"Arriving there, they must have told of their discoveries, of the battle and their defeat. They will experiment, find that the stuff they have taken is indeed impervious to their ray, and they will at once proceed to build a fleet of globes that will be armed with a plating of that gold. That will mean that their ray will become a useless weapon! It may strike our gold armored cars and be reflected to their gold armored globes, and the result will be nothing.

"We have no knowledge of any other weapons that they may have. By experimenting, they may so alter the frequency of the green ray that it will destroy gold, and in such a case we would be entirely at their mercy.

"Whatever weapons they may use, and whatever weapons we may invent to counteract them, it would seem that the future promises only a succession of battles, attacks and counter attacks, until one planet or the other is conquered or tires of the struggle.

"It is unthinkable that we can go on in such a way! There will never be a day when we can feel safe from attack. Those globes travel with such lightning-like swiftness that they may strike and be away before we can organize at the point of attack. The other extreme is equally untenable. We can not build so large a fleet of space cars that they will be able to constantly patrol the whole of the world and keep it safe. Perhaps we could build them, but to maintain such a patrol would necessitate giving our entire attention to that one activity. The whole structure of civilization would crumble with such a drain on our resources, and in the end we would attain only that which we strive to prevent—chaos!"

The professor paused, keenly scanning the faces about him; faces that were grim before the picture that he had drawn. He continued:

"So far I have gone on the supposition that we would be on the defensive, always waiting for the fight to be brought to us. There is an alternative. We can take the fight to the other planet!"

Confused Feelings

THERE was actual need for the professor to pause after his last words. The murmur of astonishment that went up from the astounded men would have drowned any words he might have uttered. A man at the far end of the room rose to his feet.

"And suppose it were possible? Suppose we did carry the war to the enemy; what could we do that would settle the matter? You have said that it might take years for them to conquer this planet. Would it not merely reverse the situation to attempt to conquer that other?"

"Yes!" The professor's head was up, his eyes flashing with the knowledge of what he had yet to say. "To attempt to crush the people of that planet would be merely the reverse of my argument. There can be but one way that will absolutely guarantee a lasting peace—and that way we must choose! We must destroy that star! by destroying Saturn and her eight moons."

From the babel of voice that filled the room one rang out sharply.

"Hear me! Hear me! In God's name, Professor Maynard, are you mad?" It was a European astronomer who cried the words. "We are separated from a planet by millions of miles, a planet that is vastly larger than our own world—and you propose to destroy it! You cannot! You must be mad!

"Do you realize what you would do if you could succeed? The whole planetary system depends on its units as a whole to give it stability. Destroy one of its members and you have destroyed the equilibrium of the whole! Would you attempt to wreck the universe?"

"Yes!" the professor spat out the word. "Rather would I destroy the whole universe than have it at the mercy of a world of human wolves. Is it not better to strike hard for peace and safety and run the risk of quick extinction, rather than to see the world die a lingering death with its peoples subjected to unknown horrors?

"You say we cannot destroy the enemy star. Presently I will give you proof that we can. As for the danger to the whole system, have you not over-estimated the risk? One planet is but a small part of our solar system. If one planet goes there will be changes; there must be some changes beyond a doubt, but will those changes be any more than a small shifting of the members to form a new state of equilibrium? With these figures which I will give you I hope to convince you." He passed a sheaf of papers to the astronomer, and again spoke to the whole company.

"The idea is not mine, gentlemen. I am growing old, and conservative. It remained for youth to point out the way. To me the thought of warring planets, and cars that travel through space is still a novelty, even after thirty years, but my son has grown up surrounded by such ideas. All his life he has studied my workings, followed my experiments, and from the knowledge that he has gathered he conceived the idea that will enable us to pull Saturn from its orbit and send it speeding into the sun. I was skeptical at first, but he convinced me. I pray that he may also convince you so that you will lend him the support of your nations' power. Gentlemen, I present to you my son, Donald Maynard."

Amidst a dead silence, Donald stumbled to his feet. Vaguely he was aware of a sense of hostility within the room; hostility directed not at himself, but at the idea that he was to explain. He started carefully, choosing his words so that they

might convey to those others the faith that was his.

CHAPTER VII

Donald Maynard's Idea

"GENTLEMEN," Donald swept the room with his glance, "there is much that I must skim over without going into too great detail. Most of you here tonight are primarily statesmen, not scientists, and I mean no insult to your intelligence when I say that the finer details of my plan would bring out much that you would not understand. I shall tell you what I propose to do, and how it may be done. The proofs of my statement are all included in those papers which my father has already surrendered. The scientists among us will go over those papers, and it shall be for them to tell you that I have proved my case.

"Today, each one of you rode in the machine known as the space car. No doubt you notice the absence of any visible motive power, and also its unique method of control. That keyboard at the front controls the tubes that are mounted around the walls of the car. Those tubes, each having six elements, are reversible in their action. With current flowing in one direction, they increase the pull of gravity of any body toward which they are directed. If the polarity of the current is reversed gravity becomes a repelling force from the same direction. Now, then, if our space car had but two tubes, one forward, one aft, and the car was pointed toward the sun, it would move toward the sun if the front tube was energized so that the sun's gravity would draw it. If now the rear tube was energized so that in effect it pushed against the earth, then the forward motion of the car would be increased. Am I making myself clear?"

Many heads nodded, and Donald continued:

"In practice we have many tubes, each directed at a different angle by means of the lead shielding about them. When the operator wishes the car to move he simply energizes the proper tubes in the right direction and achieves motion. Changes in direction are made by using other tubes to pull or push on the various heavenly bodies.

"Now for the moment imagine such a car traveling through space. By properly directing the filament current through the tubes the operator may so equalize the pulls in all directions that the car will become motionless, and hang suspended in space. Let us further suppose that the car is suspended in such a manner between the sun and Saturn. By holding all the other tubes constant, and increasing the current flow through the tubes that are directed toward the sun and the planet, a direct strain may be placed on the two bodies, tending to pull them together. Since the sun is so much larger and heavier it is logical to conclude that the actual tendency would be for the sun to remain stationary, while the planet would strain to move toward it and with it all its eight moons, Dione included.

"The gravitational field of the planetary system is so great a source of energy that any one car has unlimited power at its command. However, the practical limit of power would be reached when the strain on the car itself became so great that the car would be in danger of being pulled apart. It would be impractical to build a car so strong that it could stand the enormous strain that will be necessary to start Saturn from its orbit, but it is possible to build a fleet of cars, the combined efforts of which will move the planet."

"You can't! You can't; it is impossible!" The words were almost sobbed out by one of the delegates. "Man, all the power in the world would not move such a mass!"

"My friend," Donald turned toward the speaker, "you must consider more than the power of one world, we are dealing with the universe. You must forget your present knowledge of weight and mass as they are known on earth. You have seen scales delicately balance, with perhaps a huge weight on either side. It takes but a fraction of an ounce to disturb that balance. The universe is like that, each member nicely balance by opposing forces. We have but to strengthen one of those forces on one member and the balance of that member will be destroyed, making it move as the stronger force directs.

"Among those papers before you, you will find the estimated weight of the planet as astronomy has given it to us. You will find an analysis of all the forces that give Saturn and its moons their equilibrium. You will find the safe power of strain of one space car built according to the given specifications, and you will find the number of such cars that will be needed to move our enemy. That number runs well up over eighteen thousand. We must allow for errors and for the possible failure of some of the cars when they are put to the test." He paused, and once more his glance swept the room. Then he leaned forward in his eagerness.

"Gentlemen, pledge me twenty thousand cars, armor them with a plating of gold to ensure their safety if attacked by the globes; recruit me a force to man those cars under my direction, and I pledge you, within two months from the time I take charge there will be one less planet in the solar system. The decision is in your hands."

Donald Wins

"QUESTION!" a voice cried, "only this one other question! You have eight hundred million miles between you and your objective, a distance so great that with light traveling at one hundred and eighty-six thousand miles per second it takes over seventy hours for a beam to travel from that planet to us. Today your father demonstrated that the space car has great speed,

but can it attain a speed great enough to traverse such a distance in the ridiculously short time that you have stated? Tell me, what is the maximum speed of the car?"

"It has no limit," answered Donald gravely. "The thing that limits speed as we know it is friction. Given a certain amount of motive power a machine will accelerate until the friction of its moving parts, and the medium through which it travels just balances the force that propels it. Then the speed must become constant. If there were no friction, acceleration could go on for ever.

"Beyond the atmosphere, in outer space there is only a void, and so there can be no friction. The only thing that can limit the car is its own inertia, its own weight, that prevents it from reaching maximum speed instantly. However, it may start, and gain continually, so that its final speed is limited only by the time that it is in motion. When one is drawing from the power that holds the whole universe in its grip, one has infinite power at his command, and acceleration may be infinite. If you can imagine such a thing as infinite speed with that speed constantly added to by an infinite number of miles per second, then you will have some idea of the ultimate speed of the space car!"

Again the babble of voices filled the room. Man talked to man, building up arguments and breaking them down. A statesman took the floor.

"The scientific phases of the problem I am quite willing to leave in the hands of those whose knowledge fits them for the task," he declared, "but there is a problem of another nature to consider. To armor twenty thousand cars with gold will pull the gold store of the world so low that it will need to be withdrawn from money circulation. What then will we have for a standard? How can we prevent financial ruin?"

"Easily," cried another. "We represent the powers of the world. We can establish silver as a practical working standard at its present value in terms of gold. We as a body can authorize a commission to issue world bonds as certificates of indebtedness for all the gold that is surrendered to us. Then when our warriors of space return, with their golden cars, we can salvage the gold and re-distribute it."

The scientists suddenly stood as a body, their spokesman crying for attention.

"We have examined the proofs that were given to us," he announced firmly. "The plan as submitted is sound, built on established knowledge of the sciences. We have every reason to believe that it may be successfully carried out."

"Your answer, gentlemen, your answer?" Donald turned to the statesmen, his fingers gripping the edge of the table until the knuckles stood out white. "Will you pledge me those——"

The question was lost amid the thunderous chorus of assent.

CHAPTER VIII

Preparations and the Start

DAYS slipped into weeks, and weeks became months while the world labored. As the fleet of space cars grew, new men were enrolled and instructed in their operation. A regular patrol was established with the double purpose of giving the recruits actual service experience, and at the same time watching for enemy globes. No expense or care was spared in making the new cars fit for their daring journey. Insulated walls to exclude all temperature changes, oxygen generating plants to replenish the air, new batteries chemically recharged, giving off oxygen instead of hydrogen gas; these were but a few of the wonders of those craft.

Quite early the need of a fit gathering place for the finished cars became apparent. In all the world there was but one place that answered the purpose; a place of waste and barrenness; the great desert of Sahara.

The two Maynards, father and son, toured the world, keeping a sharp eye on the construction, forcing the production to the limit of the nations' ability.

The sixth month neared its end. Two groups of fifty cars each were yet on the ways. Then came the day when the radiophone roared its message:

"Twenty thousand space cars await orders!"

The work was done!

In company with his father and Louise, Donald left his Long Island home and sped through the upper air to the Sahara.

There was no confusion, no aimless rushing to and fro on the desert. Stretching out over the sands, as far as the eye could see, lay row on row of the huge cars, each housing its crew of four men.

Donald hastened to the car which he was to command. Thrusting his head within, he called to the signal operator.

"Sound the signal," he commanded, "we leave within the hour."

The quiet of the Sahara was suddenly split by the sound of the radio horns. Men rushed to their posts. A clatter of sound filled the air as twenty thousand metal doors began to clank shut. Only a few minutes left now!

Professing a sudden interest in a nearby car, Donald's father wandered away, leaving the girl alone with her lover.

"Darling," he whispered, "look! It is wonderful. Thousand after thousand of cars. The answer of the world to its attacker;"

The girl did not follow his gaze. Instead she dropped her head to hide the gathering tears. A strong arm suddenly encircled her.

"You mustn't," he chided gently, brushing the tears from her cheeks. "In three months I will be back, and then we shall know all the happiness of which we have been cheated for the past months. Be brave, little girl."

For a long time she clung to him, wordless. Then at last she forced a little smile to her lips.

"I'll not say goodbye," she whispered, "only—till we meet again."

The foremost space car, lifted from the ground. Another followed, then another. One by one that whole vast fleet took to the air. Resting motionless, half a mile up, the first cars waited for the rest of the number. Slowly the column took form, a hundred cars abreast, two hundred deep, with that car holding Donald in the center.

Awed by the sight, the spectators on the ground stood in the shadow that lay over the desert like some huge carpet of ebony interlaced with spots of gold.

The first row of cars moved. Slowly at first, then rapidly gathering speed the column moved up and away. In five minutes it was lost to sight.

Fifteen minutes passed. The professor sighed deeply. Perhaps he, too, longed to be with those departed warriors.

"Come, Louise," he said gently, "we must go home."

Silently the girl turned and followed him into his car.

"Au revoir, Dad. Keep your eyes on Saturn!" Donald's voice rang through the car. Then the voice became softer. "Courage, dear girl, courage."

The professor bowed his head in silent prayer, then spoke aloud.

"Would to heaven that radio could bring back his voice through the days ahead, but even science has limits."

CHAPTER IX

The Passing of a World

DONALD pulled himself from the abstraction that gripped him, and thoughtfully scanned the meter board.

"Henry, look! he whispered.

The man addressed raised his eyes to the board.

"What is it?"

"The meter—the speedometer; Ten thousand miles a minute! Faster than anything in the universe but light!" There was awe in Donald's voice. He snapped open a shutter to peer from the port out into the void.

"We're nearing Beren. Less than a hundred million miles now. We'll try it at the twenty milllion mark."

Quiet fell within the car for a time.

"Still accelerating." It was the man Henry who spoke. "We'll be there in less than a week. Hadn't we better start to slow down?"

Donald nodded and reached for the transmitter.

For a month of earth time the fleet of space cars had been hurtling through space, gaining increased velocity with every passing second. Donald had said they had infinite speed. Purposely he had restrained himself from ordering that maximum. He was content to drive his fleet at an easy operating rate, thereby lessening the danger of overstrained tubes and burned out filaments.

For the next five days the cars rushed on, steadily diminishing the velocity that they had been gaining for days. Donald looked at the car clock. It was noon earth time. He turned to the radio again.

"Kill all speed and stand by to come to rest!"

Reversed tubes began to drag on the cars. As the hours passed the needles on the speedometers swung slowly back over the course. Donald stepped to the rear berths, and awakened the other two men.

"It is near time," he told them quietly. "I may need you."

"Twenty-one million," announced Henry.

The radio called its order again:

"Stop!"

Slowly the needles dropped to the zero point.

"Come about and balance."

The operator in Donald's own car manipulated the keyboard with flying fingers. The car circled until its nose pointed to the blazing orb of the sun, now dimmed by distance. The other cars followed. Grouped together, side by side over a cast circle, like a huge bundle of stubby cigars suspended in space, the cars rested nose to the sun, tails pointed toward Saturn.

As one car after another reported its position and well-being, Donald's heart began to pound so that it seemed to echo through the whole interior of the car. He leaned toward the transmitter again, trying to speak, but only an inarticulate squawk came from his throat. For what seemed like ages he fought to regain his calmness. It would not come! Try as he would, that lump in his throat kept interfering with his speech. At last the lump settled; slowly the constriction left his throat until suddenly leaning close to the transmitter he shouted the one word:

"Pull!"

An hour passed. Donald consulted the instrument board.

"The same," he breathed, in answer to the questioning look of the operator. "Nothing has moved!"

Another hour! Still those thousands of cars tugged at their invisible halters with no apparent effect. As motionless as a statute, and almost as white, Donald sat before the still meters.

"It must work," he groaned, "it must. But to start such a mass—it will take time."

Another day passed eventless, while Donald hardly left the board. Overhead the clock ticked the minutes away. Five o'clock, earth time. Six o'clock. Seven! Donald dozed. Suddenly he started up and rubbed his eyes. Did he imagine it, or did that needle on the speedometer flicked ever so little? Yes, it stirred again, so slightly that but a fraction of an inch lay between the needle point and the zero on the scale. The gap widened another fraction. They were moving—moving toward the sun—and with Saturn in tow!

Into the Sun

ACROSS the boundless emptiness of space the helpless planet sped toward the sun. Twenty millions of miles to the fore the huge fleet of space cars tugged on, faster—always faster. As the tow yielded to their power caution went to the winds. The commanding car flashed the signal for the limit of speed that the cars could stand, and dully glowing tubes suddenly became bright! Infinite speed Donald had said; Infinite speed they fast attained!

Time passed unnoticed; the marvelous cortege swept on. As the days passed, the blazing orb that was the sun grew larger, closer, blinding in its dazzling brilliance.

Hovering over the meters, Donald anxiously made numerous calculations. The added pull of the sun's natural attraction began to fasten on the hurtling planet. The load on the space cars lessened perceptibly. A little while yet! The calculating machine clattered sharply.

Suddenly Donald whirled to the transmitter.

"Cut loose," he cried, "cut loose and circle. Quick, or we will be into the sun!"

Millions of miles were whirling by each hour. Traveling at such a speed it would be impossible to stop the space cars even if the pilots would do so. They cast loose from their victim. In a wide majestic circle they swept around. Fear gripped them at last. Those men who had dared the unknown, who had ripped a planet from its place in the universe, were suddenly afraid. With every available tube that could be brought to bear pushing against the sun; with every other tube pulling away from it, they fled from the vicinity of the impending catastrophe.

And Saturn?

Adrift within the field of the sun's full force, already moving with a velocity so great as to be unrecordable, it rushed straight toward the heart of that fiery mass, carrying with it the eight moons.

To the watchers in the cars it seemed eternities; actually it was but a little time before it struck. As the distance grew the girth of the planet became smaller, dwindling until it appeared only as a black marble against a curtain of molten gold. Then—it was gone! Dazzling rays of even brighter hue seemed to leap from the sun, hang quivering, and die. The space cars lurched giddily as the two great masses came together and fused into one. A cry came from one of the men. He pointed a trembling finger at a series of black dots, just as they too became lost in that sea of white heat——the eight moons of Saturn, following their master to doom!

The nerveless commander turned staring eyes away from the port of his car. Like one who is blind he felt around for the signal transmitter.

"Home!" The one word slipped out thru space, to be echoed by every man in the fleet.

"Home!"

CHAPTER X

The Heart of the Universe

NIGHT after night Professor Maynard had sat before the telescope. Night after night he had turned its huge glass eye up to Saturn and then to Dione, barely visible. When ageing eyes had wearied of the strain he had called Louise, and together they had kept their vigil.

On the evening of the thirtieth day since Donald's departure they again entered the observatory as dusk began to change to dark. The long strain had left its mark on Louise. Her blue eyes were shadowed by growing circles.

"Why, oh, why doesn't something happen!" she cried. "Tell me, Professor, tell me again that he must be safe!"

The elderly scientist gently drew his arm over her shoulders.

"Courage, dear girl. Remember that was his message: courage. He is safe, I am sure. He has a long way to travel, and it must take time. Do not place too much store in the things that you see—or do not see happen. Remember, little girl, we cannot see any movement of that planet until nearly three whole days after it has actually moved. It will take that long for its light rays to reach us."

The girl bit her lips to stop the flood of her emotion.

"Three days!" she whispered, "three days before we can know! Oh, it is cruel!"

For a long time they sat silent, each busy with his own thoughts. The evening grew late.

"You are tired, Louise," the professor chided gently. "It can do no good, our waiting here. Won't you let me send for a car to take you home? I will radio you if anything happens."

"I—I believe I will go. I am tired." The girl started to rise, then suddenly she clasped the arms of the chair while her eyes sought those of the scientist.

For gradually and then increasing in volume until it became a great terrifying roar they heard the wind lashing about the house, and the terrible beating of the surf on the shores miles away. Beneath them the floor heaved queerly and they had the strange sensation of descending into a great pit.

"What is it?" she shouted against the beating thunder of the wind and waves. With startled senses and an awful fear she awaited his answer.

"We are sinking, the earth is sinking," the scientist shouted into her ear, moving toward her. Then with a bound he reached the telescope and swung its ponderous length over the arc of the heavens.

Louise rushed to the window.

"The moon! Look at the moon!"

Overhead shone the moon, more than three quarters full. For centuries—ever since the beginning of recorded time, that moon had lighted the

(*Continued on page* 82)

The MARBLE Virgin

By Kennie McDowd

And the beam of light coming from the horn changed from fiery incandescence to gold. I held my breath ..Before my eyes I saw a wave of pink flood her body and climb into her face. Huxhold whirled a dial, the beam slightly ascended so that it swept no lower than the bottom of her toes. He was sobbing curses.

CHAPTER I

Last Words

KENNIE McDOWD

TIME, as everyone knows, is valuable and cannot be recalled. An hour from now, perhaps, less than that, time probably will mean nothing to me; possibly it will be a factor with-which I no longer have to bother—but now it is vitally important. I am faced with the task, self-imposed it is true, of reporting certain events, and I dare say that no historian ever was so impatient to see "Finis!" typed at the foot of the last page. In sixty minutes, or less, I shall go to join *Naomi,* the marble virgin!

But before I go, while yet I inhabit a living body, and breathe, reason and act in the normal manner customary to me, I want to chronicle all that has happened in the last four months, beginning with April. When I am gone into the great void with a body of I know not what shape or contour, (if a body at all) I want the world to read these pages. Thus all mankind will learn why I acted as I did, and why I will dare inconceivable possibilities of terror to become invisible so that I may again claim the marble virgin.

To become invisible! I mean nothing less than that, but *more!* I mean that I, Wallace Land, shall enter the terrible *cabinet* devised by Professor Carl Huxhold; I shall be bathed in the awful rays of invisible force emanating from Huxhold's fearful *electron-dissolver* — and become nothing! Nothing, unless his tale is true, and I am shot forth into the vapor-filled Universe a mass of radio-active split-electrons, to find Naomi.

That is what I hope will happen, and what I feel assured, without knowing why, *will* happen!

Technically, in the eyes of the law, I am a murderer. I do not accept this charge, for I believe I was but an executioner, whether legally justified or not. Professor Carl Huxhold deserved death. I am only sorry it could not have been done gradually, to stab him one by one with a thousand twisted knives! You will say I am mad. I contradict your declaration. Huxhold took from me that which I prized more than sweet life itself—Naomi!

And when I saw that she was indeed *gone,* and Huxhold in his hour of triumph taunted me and swore that I should never again clasp her in my arms, and never again would feel her delicious kisses on my lips, I killed him! God, it was a pleasure to thrust the knife into his cruel heart, to see his demoniacal face whiten, his popping eyes stare, and finally to see the crimson flood gush from his breast as I drew the knife out and he fell!

But I must get on:

Perhaps my name, Wallace Land, means nothing to you. Yet among any circle of sculptors it is uttered with respect.

"Wallace Land?" someone asks. "He will go far!"

And the talk is eager and enthusiastic. Why not, when I have had commissions that excited envy from sculptors much older than myself?

A Sculptor's Tale

I BEGAN early, with clays. At twelve I could so use my fingers as to pat and form and mould a semblance of life into the tiny figurines I worked on. Though my parents were poor, they contrived to draw attention of the right people to me—so that I became the protegé of a wealthy lover of sculpture, and was sent to Paris, Rome and Berlin! This, when I was but eighteen. You are correct in assuming that I was proud!

Yet do you know what one must go through, to become capable of reproducing in marble the likeness of, say, *a woman?* As the artist has to master pigment mix and the judgment of color values; as the musician is relentlessly enslaved to the practice of certain difficult scales, so does a sculptor bow to the acquisition of knowledge in moulding. He usually studies from models in the nude, learning how a bare body looks in hundreds of different positions. Then it is a matter of endlessly striving to duplicate. As in anything else, practice must complete his tutelage. It was in this way that I, Wallace Land, studied abroad.

For three years after returning from Europe, I labored hard. One, with the skill I have, need never be idle! God allowed me to reach

THE question of what distinguishes life from inert matter, has ever been one of the great mysteries long before there was ever such a thing as science. Yet, chemically, we know that there is no difference between matter that contains life and inert matter that does not.

Recently, two Russian scientists demonstrated the fact that it was possible to actually kill a dog by decapitating the animal and keep the head alive artificially by substituting artificial means of circulation.

In other words, after life had departed, the dog was made to live again artificially at will. Sooner or later, it will be possible to go still further into the realms of this branch of science.

Improbable as the accompanying story may sound, at first, it is certainly based upon excellent facts and some such thing may actually come about during the next few hundred years.

twenty-eight, my present age. Possibly it was Fate who decreed that I was to meet Professor Carl Huxhold, for I should never have met him had I not moved!

I shall go back to the beginning: to that morning in April, four months ago. Hardly had the snow disappeared off the nearer hills, yet Spring spoke in the soft, warm winds that blew, and already the cottonwood trees had new, gleaming, miniature leaves. The park greens were velvety, lilacs about to bud forth, and that aroma of hedge-rows quickening with fresh sap came to one's nostrils like a piquant wine. It was spring! Geese were flying over, booming down peans that must ever excite adventurous youth!

The studio where I had worked since coming back to America was a big attic room on the third floor of a great, red sandstone building. My living room abutted it. Though it was impossible during cold weather, and I could easily have afforded quarters more comfortable, I am one who dreads a moving and so had endured its cheerlessness. The last winter made its shortcomings more apparent than ever, yet I had made no effort to seek out a place more to my liking. But April, dawning with her subtle assurances of spring, brought about a change.

Suddenly I felt myself answering Spring's magnetic call. I wanted to bound, to caper like a frisky colt, to run! Remember, I am but twenty-eight! No less sensitive than any artist is, I responded to a seasonal impulse. I would move! It was a time when all things moved, one way or another; the birds migrated; geese flew off to habitats that they always sought in spring. Partaking of the migratory spell, I would move too!

An advertisement in a morning newspaper brought me here. To a little apartment house, with a spacious, pretty park adjacent on the north. What a slim, stooped man of middle-age who was the janitor, had to offer consisted of three rooms on the second floor. On inspection, they were revealed to be all that I desired, and the terms of lease were satisfactory. Wonder here makes me pause—who will be the succeeding tenant, when I have left to seek the marble virgin, Naomi?

"Professor Carl Huxhold"—I read the neatly engraved card tacked to the door of room number 12, directly opposite my new studio, as I prepared to insert a key in the lock. It was my first day in the apartment house. I had just returned from breakfast downtown.

No premonition either of good or evil came to me, as I read the name. All that I conceded myself was that I at least knew the name of one tenant, a neighbor on the same floor. He might turn out to be a bore, a grouch, or a good fellow with whom it would be interesting to chat, I knew his name only.

But even as I stood there, fumbling for the right key on my key-ring, the door bearing the little card tacked upon it opened. It was Professor Carl Huxhold at whom I stared.

CHAPTER II

Professor Huxhold

SHORTER than I am, he had a body like a barrel—or like a gorilla! Hanging low at his sides, the backs of his hands, and what I could see of his wrists, were as hairy as the legs of an airdale! Wrinkled and ill-fitting was the dark suit he wore. Yet his face was clean shaven and smiling. And his curious, sea-green, slightly-popping eyes twinkled at me from behind thick pince-nez!

Never shall I forget this—my first impression of the man. It was so different from a later opinion, when I knew him better. At this first meeting, I rather liked him; it was difficult not to like him.

"A scientist!" I told myself. "Above such things as clothes Brainy—no doubt of it!" For Professor Carl Huxhold had the shape of head that fiction writers like to ascribe to Martians: bulging and dome-like, narrowing down to a pointed chin which, however, did not retreat. Here was a man who soared infinite realms of learning, who delved in the very bowels of knowledge!

Personal magnetism emanated from him. Under his peculiar twinkling gaze, I felt that an *aura*, invisible yet commanding, was enveloping me, Then my skin prickled and I felt the epidermis tighten on the back of my neck! Was it because I suddenly realized my proximity with a being who recognized no inhibitions before his scientific lore? Did I fear for myself? Was some sense beyond the sixth sense, a not-quite-eradicated memory of an age thousands of years gone by, trying to warn me?

Then he was holding out his hand and introducing himself. "Wallace Land?" he smiled. "Jamison (the janitor) said you were moving in! Come in and see me sometime; when you aren't too busy with your clays and marble!"

Almost before I could mutter some greeting in reply, he had clapped me on a shoulder and hurried off. Puzzled, I watched him run down stairs, taking the steps three at a time. But I was to learn that that, too, was in tune with his queer abilities. Huxhold, I found, was the hot-bed of high-tension energy! He was unable to walk slowly, but skipped along like a boy, half running. Odd-mannered, his brain flashed like lightning; cut-slashed, leaped figurative mountains, to reach logical goals —*or results so illogical and true that none save himself could understand!*

I visited with him, and he with me. He was most interesting, all right! But many times I was as uneasy in his presence as though I had been a young girl caged with a madman! That brain of his—God! Why he endured my visits my blundering ignorance; why he cared to come to *me* and explain his marvelous deductions, will ever be beyond my comprehension. I, Wallace Land, have very little understanding of the sciences.

Radio? Perhaps I could stumble through a description of a simple, one-tube receiver; nothing

more complicated. Huxhold devised a twelve-tube radio with which, one night that I was with him, he logged two hundred and twelve stations, in this country and Europe, South America and Africa! On wave-lengths, he explained, ranging from fifteen meters to a thousand! It was like an easy-chair adventure throughout the world!

Huxhold talked of Steinmetz, DeForest, Marconi—and other geniuses in things electrical.

"Bah!" he exclaimed, his sea-green eyes seeming to glow with chameleon colors. "Let them come to me! I will give them greater inventions than television! Bah!"

"Do you consider them so much inferior to yourself?" I asked, somewhat nettled.

Professor Carl Huxhold laughed. Merriment such as his, I have never heard elsewhere. It was contemptuous. It jarred by its jeering note. It made a hearer's heart pound with rage. Yes—even though the undercurrent of ridicule that ran through it was intangible; as it was to me!

But on that occasion, which was early nightfall, he vouchsafed no information concerning some fearful capability. We sat in his living-room, a disordered place, smoking. April had come and gone. This was the night of May-day.

Those days I was doing very little serious work. It was spring—perhaps I had the spring-fever, though I have always believed that that expression is but an excuse to cover laziness. Still, I was finding it impossible to concentrate as I wished. Huxhold's strange personality was driving all thoughts of art from my head. It maddened me. I could not put out the directed effort—of will, imagination and physical skill, that is necessary if I am to do artistic sculpture!

I took to avoiding Huxhold. He sensed it, and twitted me with it, which further angered me.

"What was he to me?" I asked myself, bitterly. "Was I not Wallace Land, the sculptor?"

The Inspiration

WHATEVER my shortcomings, I consider that art is greater, of infinitely superior benefit to the world, than any cold cruel law of science, or machine of metal rods and wheels. No doubt the latter are necessary; but they do not further the march of intelligence as does art. Huxhold merely experimented. His entire apartment resembled a machine-shop; even a junk-shop; such was its scramble of contrivances of all sorts! There were littered tables of chemicals, retorts, apparatus; and electric-furnaces, irons and devices, more than I had seen in any laboratory!

But, thought I, all these are not comparable to a single piece of sculpture, where every line of the carved marble is like a lyric!

Huxhold apparently had wealth beyond any desire that he might entertain. If he chose to pursue scientific machinations, why let him. Certainly it was none of my business! I realized that I was being very foolish in thus allowing any one to distract me from my art. Presently I began to feel mentally rectified, at ease in spirit, and ready for work. God gave me great skill, and I would use it greatly.

On a dais in my studio there rested a block of gleaming, white marble. It stood an inch over five feet in height, over eighteen inches through. It was of itself beautiful, but I saw in it something more beautiful still! Wonder pounded in my brain, as blood sometimes pounds at the temples. Could I—I, Wallace Land, carve this block of marble into the likeness of a maiden on the verge of womanhood? Into a superb marble virgin seeming to stand at the threshold of all God intended His priceless creation woman to be? Could I? The vision with which I was inspired was flawless, perfect! *I could!* I trembled with the power that suddenly seemed to sweep through me!

When completed, I would call the marble virgin—"Naomi!"

Already I could see how the finished statue would appear. Already I knew what the posture of her limbs would be. Already I pictured the delicious curves of her arms, her throat and breasts, the tilt of her small round chin, and the moulding of her shell-fragile ears! God, she would be beautiful! If my great talent could bring reality forth from the vision!

Huxhold should be forgotten. In the tremendous requirement of energy for the lovely task, Huxhold should be absolved from my thoughts. I would live only for my dream in marble; that I might not mistake a single chisel stroke!

Having decided upon this course of action, I went directly to work. Why be tardy to a task as glorious as mine? With the fire of inspiration glowing at white heat in my brain?

But upon the second day, the man, whom I supposed I could erase from my life as a slate is wiped, intruded himself. Looking up from labor on the marble when I heard the door open, I saw Professor Carl Huxhold entering. Strangely enough, I was not sorry to see him. In a way, despite antipathy to his personality, I had grown to like him. It was not friendship, but interest. Huxhold *was* interesting!

He nodded appreciatively at the cutting which was accomplished on the marble; and nodded again with comprehension of my objective!

"A woman?" he asked, thrusting his hairy hands in his trousers pockets.

"Yes," I said simply.

For a matter of minutes he said nothing else, but watched while I worked. I was exasperated that he had guessed what my skill was toward, and that I had admitted it, and with the probing glances which he bent upon the marble! Somehow it seemed as though the white stone *was* a woman, bare and beautiful, and that Huxhold was feasting his hot eyes upon her nudity!

I threw down my tools. What I would have said was restrained, as Huxhold asked me an amazing question!

"Wouldn't it be great, Land, if the marble could be brought to life?"

I stared at the man, doubting his sanity. Then I smiled. He was joking, of course; kidding me! I said as much.

"Maybe," Huxhold mused; and he walked out without another word!

CHAPTER III

The Inspiration Takes Form

MAY passed. It was a month of many showers. In the shelter of my studio, intent upon the marble virgin, I did not care when it rained—was hardly aware of it when it did. But every evening that it was possible to be out, also in the fresh early mornings, I took long walks. These journeys rested me; they solved the problem I know every artist faces—the let-down in spirit after tense, concentrated effort, when it seems that the result of one's application isn't near as perfect as was the pre-vision.

I was kept optimistic, happy. From the season itself, I believe I took a subtle something which went into my cutting.

Huxhold, too, was busy. But upon what I knew not. He did not call, nor did I visit him. We met in the hall, and passed greetings. That was all. Yet I sensed, perhaps from his strange burning glance when it briefly rested upon me, that I was in his thoughts. And I flattered myself that it was respect of me, engendered by my art!

From Huxhold's apartment came the noise of pounding, the rattle and clank as his lathe whirred, and the buzz of a little sawing. Once I heard the crackling sizzle as when the carbons of an arc-lamp are caught and pulled apart flaming; or the sound that wireless makes, the buzzing discharge across a gap before electrical energy leaps into the aerial—and on across space. Huxhold was busy upon television instruments, I thought, devising a method by which storage-batteries might be charged by radio. Huxhold had told me that he was interested in the possibility.

Meanwhile, sixteen, eighteen, twenty hours a day, I used the tools of my art upon the statue, the marble virgin. It was hard work, but I gloried in it, loved it! Loved it as I loved the marble upon which I toiled! Because every day it became more beautiful, more the perfect likeness of a woman, a virgin like unto Eve herself! And "Naomi," the name I had given her, was as fitting a name as that borne by the first woman on this earth!

And I, Wallace Land, sculptor, loved Naomi! I loved a likeness that I was creating, a young woman in marble!

Without conscious arrival at such a conclusion, I believed that Fate, the gods, or what-you-will, had decreed it. Had foreordained that I was never to love before, but would be drawn in irrepressible mate-hunger to *her!* And always I would seek unlove, because Naomi was stone! It was a terrible answered kisses, unanswered response to my great realization to accept, was it not? After, with these hands the servants of my talent, I had made her into the lovely creature which she was?

I could love her, but the marble virgin could not reply with one endearing word. Though the expression on her face was pleasant, Naomi could never smile; and nothing, unless I put it there, ever could bring a dimple to her smooth firm cheeks.

Yes, foolish as it may appear, I was daily more enraptured of the marble virgin, Naomi. Not silly; I refuse to admit that; nor acting an iota as though she were flesh and blood. I loved her as any artist loves a pet brain-child, a work that he is proud of and responsible for, and that is all. Am I to be blamed if I entertained the wish that she *was* real? I did wish so, with all my heart!

It was about this time, the first of July, and the days often uncomfortably hot, that a series of loud, mad, excited shouts emanating from the apartment of Professor Carl Huxhold brought me on a run to his door. The hour was six, in the evening. I instantly concluded that Huxhold must be hurt, perhaps caught in some of his machinery, and had yelled to attract my attention.

But, no!

Unhurt, Huxhold stood near one of his laboratory benches. His pince-nez dangled from the ribbon attached to his vest; he evidently had torn open the neck of his shirt in a fine disregard for good cloth and buttons; his hairy chest was exposed. The expression on his face was terrible, and I started abruptly back after throwing open his door.

"Come on in!" Huxhold insisted. "I'm all right! I lost my temper and did some tall cursing, because that damned beast bit me!"

Huxhold pointed beneath a bench, where a small nondescript cur, very frightened, trembled and crouched down. "A dog? What in the world——?" I began.

Huxhold for the moment made no answer, but bound up his bitten hand. He now had his glasses back astride his nose. And his curious, sea-green eyes glittered strangely behind their thick little windows. Then—

"It's done, Land!" he swaggered. "The greatest piece of apparatus in the world! Carl Huxhold is the inventor! Look!"

The Great Invention

I followed the directing wave of his bandaged hand and for the first time *saw the electron-dissolver and the cabinet!* The latter was six-and-a-half feet tall, with a top, bottom and three sides, but open on the fourth; the outside plain and smooth, of dark wood that I took to be walnut. The inside was not an open rectangular space, but was curved in a big half-circle from side to side, like a trough, or tub, stood on an end. This half-circle was a single sheet of thick lead, fastened at top and bottom, and coated with what I took to be enamel, or thin glass. The coating seemed to shim-

mer and glow. It was now a deep, dull red; now a vivid violet; appearing to comprise both colors and seem at the same time a weird green!

The open side of the cabinet faced toward the electron-dissolver: a squat, box-like affair having much the appearance of a radio, not overly large, on legs. There were many dials, switches, and tiny ammeters, both on the top and front; while directly in the center of the front was a sort of horn-shaped opening. The horn was carried six or eight inches forward from the box, and was not round at the mouth. It had a rectangular shape, its position corresponding to that of the cabinet, which it was pointed toward.

"The greatest invention in the world!" Huxhold repeated. "It was made by the great Carl Huxhold! Let us catch that damned dog, Land, so I can show you!"

"An experiment?" I demanded.

"No! A certainty!" Huxhold snatched his coat from a table where he had carelessly thrown it, and with this protecting his hands made a dive under the bench at the frightened, shivering animal. He succeeded in catching it, and came up triumphant, his eyes blazing.

"Look here!" I broke out. "I won't be a party to any torture of that dog, Huxhold! Count me out. It's inhuman!"

"Nonsense, Land! I shall not hurt it a particle! Watch and see!"

Before I could further object, Huxhold seized a hypodermic needle and had injected some fluid into the animal's neck. The dog almost immediately became quiet, lethargic, but it did not become unconscious. Now its eyes were luminous, beseeching, pitiful.

I cursed.

Huxhold set the dog inside the cabinet, where it sank on its side, watching us with that fixed, pleading gaze.

"Huxhold——" I began. But he caught hold of my arm and drew me back from between the cabinet and the electron-dissolver. Another detail drew my eyes: there were heavy insulated wires leading from the box to an electric switch above a farther bench. Huxhold snapped this switch shut, and immediately a low humming came from the electron-dissolver!

"Watch!" Huxhold commanded, his voice rising shrill and excited. His eyes snapped, glittered —glowed with a light which bordered on the insane!

Then Huxhold touched a vernier-dial, began to turn it slowly. An awful radiance shot forth from the mouth of the rectangular-shaped horn, bathing the entire inside of the cabinet, about six feet distant from it, in a torrentous luminosity!

"Watch!" shrieked Huxhold.

He touched and turned another dial. The poor sluggish-limbed dog, which had stirred and crouched lower as if hoping to escape whatever dreadful fate that it was to meet—*at once vanished! Was gone! The cabinet stood empty!*

"Great merciful God!" The cry was drawn from me involuntarily, as I blinked, and shook my head; and tried not to believe what I had seen!

I gazed at Huxhold as though he were Satan incarnate. This was necromancy, black art, demonology! Conjuration raised to the *nth* degree, and aided by the bewitchery of a genius in science!

And Huxhold's strange, sea-green eyes, glowing with fires one does not see in a normal person's eyes, blinked and twinkled behind his thick pince-nez!

"It worked!" he said quietly. His low words had all the effect of a robin's soft cheep, after the lightning and thunder and rain is over.

"Yes," I found myself saying, "it worked. My God!"

But Huxhold would not have it any other way than that I had uttered a compliment to his prowess!

"There is another thing that I want you to see," continued Huxhold in that same confident quietude. "I noticed a marble leg in your studio. Do you still have it? Will you run and get it for me? Good! But hurry!"

CHAPTER IV

A Startling Proposal

I WALKED across the hall into my workroom like a man in a dream; found the leg, a limb broken from a small statue I had made several years before, and returned with it to Huxhold's laboratory.

Huxhold took the marble leg, which weighed nearly forty pounds, and leaned it upright inside the cabinet. Again he commanded me to watch. Again I did so; my heart pounding and my hands clenched. What terrible revelation was I now to see? Would the leg disappear as had the flesh-and-blood dog?

It did not Though the broad beam of radiance again flooded the cabinet, and the glassy-surfaced leaden curve seemed to respond with reflected shimmers of weird many-colored luminosity, the leg stayed.

But there occurred a change in its appearance, even as I gazed. It grew whiter, a faint pink then suffused it, and then—the knee bent, and I distinctly saw the toes wriggle! A second later it had collapsed onto the bottom of the cabinet, the stump end, where the marble had parted when the statue was broken, *revealing itself as quivering, bloody flesh!*

Before I could spring closer, Huxhold twirled the identical dial that he had when the cabinet held the dog, whereupon the leg vanished! Was gone! and Professor Carl Huxhold's awful cabinet again stood empty!

"Now," announced Huxhold, his twinking eyes fixed upon me in an unwavering stare, "you have seen what the Huxhold Rays will do! Radio-magnetic-control? Bah! Television? Bah! My rays are a greater discovery! Do you know what I have

done? I have split electrons and protons, dissolved them into infinitely minute nothings of heat and light-flash! No scientist before me has succeeded in the feat, and there is no other living brain which can duplicate it!"

"What—what happened?" I asked inanely. "How does it work?" For I was trembling all over, and unable then to speak sensibly.

Huxhold laughed. It was a note of excited superiority. "Ho-ho! What the world would give to share my secret! But no one shall have it—it is mine, mine, MINE!" His voice rose on a timbre of elation.

"The marble leg was mine," coldly I cut in. "You made it kick, and seem like live flesh; but you didn't pay for it!"

Huxhold disregarded this thrust. He took off his pince-nez, wiped each eye-glass and replaced them upon his nose.

Then—

"The leg was flesh!" he corrected. "Just for a moment. Then I shot it forth in dissolved electrons, as I did the dog before! It now inhabits the plane of split electrons, and supposing that it has any shape or form, it is one that even I, Professor Carl Huxhold, do not know!

"Did the dog suffer? It did not! What if the damned beast had? And the leg had no consciousness! It's movement was an involuntary one of suddenly relaxed flesh. A body in the morgue sometimes slight moves; Hah— my discovery should supplant the electric chair! It could rid the world of criminals!"

"But how?" I persisted. "I don't believe——"

"You have seen? Yet you don't believe?" Huxhold again laughed, and shrugged. He continued in something of a classroom manner: "An atom was long believed to be the smallest particle of indivisible matter, Science then learned that atoms possess constituent parts—positively electrified 'protons', with countless infinitesimal negatively-electrified 'electrons' massed in a spinning, darting planetary-system about them. And it is the number of these alone that determines the element! Whether it is gold, iron, silver, a lump of potash—or live flesh!

"You see? If by some means or process the number of electrons could be altered, subtracted or added at will, then any substance might be changed into some other substance! I have discovered this secret! The Huxhold Rays, when played on any substance in my cabinet, cause the infinitesimal electrons to split and multiply! And a slightly added strength to the ray dissolves both protons and electrons, destroys the atom and the molecule! The substance becomes as nothing; it goes flying into the ether; seeking the plane of split electrons, because my ray had made it a mass of split electrons itself!"

Huxhold paused a moment. His right hand rested lovingly upon the electron-dissolver, the radio-like box with a horn. Then, his blinking, sea-green eyes upon me, he quietly added: "Now I will buy your woman statue, Land. How much?

Naomi Completed

BUY Naomi, the marble virgin? Did my ears hear aright? I returned Huxhold's gaze somewhat doubtfully. He could not believe that I would sell my beautiful work of love! Surely he spoke facetiously! And yet I knew that Huxhold was unaware of my love for the marble beauty!

"She is not for sale," came from my lips. Anger that I did not then understand began to rise in me. I added: "Not for any price, Huxhold!" I turned to leave the laboratory where I had witnessed such demoniacal use of science.

Huxhold caught at my arm. "Don't be a fool! A thousand dollars, man!"

Angrily I shook him off. "No!"

"Two thousand! Five!"

"No, I tell you!" Did Huxhold think that he had but to bid for her, as though she were a harem slave-girl?

"But, Land—think!"

"No! Absolutely no! That's final, Huxhold! My thanks to you for letting me see your 'ray' work!"

I walked out. Silently, Huxhold stood and glared. I seemed to feel his sea-green eyes, bent upon me in a mad, hypnotic gaze, even after I had closed his door and was behind mine. There in my workroom. I seized the tools of my art. The marble virgin lacked but a little of being completed. I knew that I could never let her go. She was perfect, lovely! Like unto Eve herself! Sell her? Profane her slim gloriousness by accepting a price for her? Huxhold must surely be crazy!

It was evening, two weeks later, that I gazed in awe at Naomi—the marble virgin. Naomi! That is how I will speak of her, as I continue this chronicle. White, beautiful, standing on tiptoes, one arm of delicious curves thrust backward, the other half raised before her as if she sought to grasp an invisible something in the air, her delicate chin lifted; she was lovely!

God had been good to me, Wallace Land, in giving me the skill out of which she was born! Naomi stood completed! I sank before her, pressing my hands about her feet and weeping. In such a manner did a sculptor before me once clasp the feet of his creation, while he bowed himself and wept! But the marble, *his* art had fashioned into a woman, so beautiful that he dared to pray for life to imbue her, was never to live!

But again I must remind myself to get on. There is, if Huxhold's visitor comes at the appointed hour as I am sure he will, less than twenty minutes left me. Time does not cease its flight for anyone. Huxhold's caller will notify the police; they will view the body; and be drawn across the hall to my workroom. Not, of course, to find me!

I had promised to call Professor Carl Huxhold when the statue should be finished.

After my departure from his laboratory, on the occasion when he tested electron-dissolver and cabinet, Huxhold and I had had a talk. The substance of it was this: He had expended no small fortune in preparing his scientific machine of so titanic a power; he had gotten it together in a feverish burst of genius for no other purpose than to transform my statue into a being of flesh and blood! Did I believe he could? I had witnessed the transmutation of the marble leg!

Huxhold then explained in intricate detail just how the electron-dissolver and cabinet worked. Most of it was over my head, but I remembered the dial-settings for both the conversion of objects, and that which dissolved them. There was but a slight difference of manipulation between empowering the Huxhold Ray to commute dissolution or metastasis.

Wonderful, as we common people describe something not understandable? Surely! I least of all would traduce the genius of Professor Carl Huxhold!

But as I write, I remembered the dial-settings. I would not, for any pleading of Huxhold, agree to sell him Naomi. I loved her; I caught Huxhold's confident enthusiasm that his ray would bring life to her; and I agreed to help him place her in his terrible cabinet only after he had sworn with mighty oaths to shut off the electron-dissolver when, if his experiment was a success, she lived and breathed!

Believe me, as I rose from my knees before Naomi, and stumbled across the hall to Huxhold's apartment, I was trembling so desperately that I could hardly control my feet!

"She—she is finished!" I faltered, when I faced him.

"Damn!" Huxhold exploded, in blasphemous delight.

I caught his shoulders in my strong, young grip. I looked past his thick pince-nez, deep into his curious twinkling sea-green eyes. The man's face was not agreeable to me; it was ruddy, oily, and his nose had enlarged pores.

"If you harm her——" I said.

"Nonsense!" Huxhold laughed, and his eyes glowed. "Great dickens, Land, I want see what she does! Think of it—an opportunity to study the reactions of a woman who came into the world mature, without the formality of birth!"

"Then come, Huxhold! Help me carry her! And as you value your life, be careful!"

CHAPTER V

Naomi Lives!

TWENTY minutes later, facing the electron-solver, Naomi stood within the cabinet! Huxhold snapped on a series of bright, ceiling electrics so that we might see every happening clearly. I stood beside him. The wall-switch had been closed. A weird humming came from the box whose horn was directed at Naomi in the cabinet!

"Now!" breathed Professor Carl Huxhold. He bent over; his fingers twisted the vernier-dial to a number.

From the rectangular mouth of the horn shot that refulgent phosphorescence. On either side of Naomi, the curved glassy-coated concave of the cabinet answered with glittering, shimmering, fluorescent darts of violet, deep red, and green!

"Now!" shouted Huxhold.

I took a step nearer the cabinet. Off in the distance, but the sound carrying clearly through the open windows of the laboratory, a clock in a tower far uptown began striking:

Boom, Boom! Boom!

Huxhold turned another dial to a number.

Boom! Boom!

He snapped shut a tiny switch.

Boom! Boom! The clock ceased striking. It was seven o'clock! And the beam of light coming from the horn of the electron-dissolver changed from fiery incandescence to gold! I held my breath. *Transubstantiation was occurring in Naomi!*

Huxhold whirled a dial, the beam slightly ascended, so that it swept no lower than the bottom of her toes. He was sobbing curses.

Before my eyes, I saw a delicate something—like the roseate tinge of an oyster shell—suffuse what an instant before had been cold marble! A wave of pink flooded her breast and climbed into her face! Her cheeks glowed; between lips suddenly carmine, I saw the gleaming pearls of two, white, perfect rows of teeth. Naomi's eyes took color—blue like that of an Italian sky, as the Bay reflects it at Naples! I saw dark brown hair fluff up on her head, and saw little tendrils of it escape the soft heat at her temples, to waver in a stirring of the air! *Naomi lived!*

She breathed! Her breast heaved! Then the beautiful arm which was half raised before her trembled and fell to her side! Her other arm swung forward, fingers wriggling! A foot was lifted, and rubbed softly against the ankle of the other!

Professor Carl Huxhold shut off the electron-dissolver. Exultantly he swung about toward the girl.

I shoved him roughly aside. "Naomi!" I called. "Oh, Naomi!" Whipping off my coat, I sprang forward and wrapped it about her nude, lovely form. Naomi turned her head and dazzled me with her smile! Trustfully, her hand clasped mine. "Naomi!" I said again. Gracefully she stepped from the cabinet!

"You fool!" shrieked Huxhold. "You fool! I made her live! Let her alone!" And he would have jerked my coat away and had her bare again!

Yes, it is the truth. I had felt offended at his gaze of her when she was marble, in the process of sculpture. Now she lived; and Huxhold's eyes mirrored an unholy desire! *He should not* see her! The man had become a devil!

I stormed at him: "You are forgetting yourself, Huxhold! Get back—away! Naomi is—goes with *me!*" I amended. "She—I love her!"

But Huxhold caught at Naomi's arm. She gave a pitiful little cry: "Oooo!"—her first sound in the world was a note of pain!

"Let her alone!" Huxhold screamed. He reiterated the words as if frenzy-driven. "Let her alone!" Then, like a mad man, he rushed upon me!

Thrusting Naomi behind me, I let go of her and drove a furious fist to Huxhold's face. I would give him plenty of fighting! The blow landed. Huxhold's head snapped back, he tripped and collapsed. Without waiting to see how he came out of it, I hurried Naomi across the hall and into my workroom. There, I locked the door!

"Naomi," I said—and when I let go of her she promptly let my coat fall to the floor. "Naomi, can you speak to me?"

"Oooo! she answered, cooing like a tickled baby. "Oooo!" And her cheeks dimpled, and she gave a happy laugh!

Then Naomi ran suddenly to me, threw her shell-pink, deliciously cool arms about my neck, and her lips pressed dear, indescribably sweet kisses on mine!

New Problems

TWELVE minutes are left me, in which I must complete this chronicle! A dozen periods of sixty seconds each!

Mortal man does not live who can describe the happiness of two such weeks as followed for me, in so limited a space of time!

Let me high-light, difficult as it may be, what transpired. And I, Wallace Land, am not as skillful in writing, as I am with chisel and carving tools!

First, there was the question of what I should do with Naomi—and this was quasi-humorous! Startling was the fact that I had on my hands a girl, young woman, who did not know the meaning of clothes! She was perfectly content to remain without them, it seemed; running about my workroom like a Sappho, picking up things, dropping them; and always with movements as light and effortless as those of a dancer. I had no little trouble in getting her to keep a long smock of mine on; it tripped her, and immediately she shrugged out of it!

Conversation with Naomi was impossible. "Oooo!" which she uttered delightedly with every new feature of interest that she discovered, appeared to be her limit in speech.

When I called to her, Naomi seemed to think it was an invitation to run to me, throw her arms about me and kiss me with soft fragrant kisses!

Believe me, it is not so easy to write of these things! Yet, as I sit writing them, I am conscious of a certain pleasure. It is as if I were re-living my wonderful experiences with Naomi, in a very rare dream. And quite soon, now, I shall go as she went onto the same invisible plane!

There ensued two weeks of beautiful companionship with Naomi, the like of which I know the world is incapable of realizing.

Being mature of body and in mind, Naomi learned fast—nay, like lightning! In four days she spoke a few words, knew her name, and that a shake of my head meant that she should desist in whatever she was about to do. In five, she called me "Wally"—pronouncing it "Wal-ly!"—so sweetly, in such a gentle voice, that it drew hot tears to my eyes!

In eight days, clothed in a pretty dress of sheer French voile, silk stockings and black kid pumps, outwardly she was like any other lovely being of her sex; and I ventured upon a walk with her. Charming was her reaction to the outside world, previously seen only from the windows of my living quarters! Flowers fascinated her, and birds. She was forever springing lightly into the air, as if she hoped to succeed in brushing their feathery bodies with her velvety fingers. I laughed to see her bend and pat hands upon the park greens, or snuggle her dainty nose into the cupped petals of flowers!

Professor Carl Huxhold met us, as we returned from that walk. He stopped dead in his tracks. Then with a queer expression on his face, and hands outstretched, he came forward. I noticed that his curious, sea-green eyes did not twinkle as usual behind his thick pince-nez; they were brooding, I thought. He seemed very lonely, and ashamed, and like one who has no friends. It was because of this, and the fact that I owed Naomi, as she was, to him, that I waited—with an arm, nevertheless, raised protectingly about Naomi.

"My God," Huxhold broke out. "Is it really she?" He clutched at my hand, and spoke rapidly: "Don't hold that night against me, Land! I was wild—forgot myself! When I thought of what she was—great dickens!" Huxhold whistled. I allowed him to greet Naomi.

"How do you do!" she said quite correctly, as if the pleasantry was commonplace to her!

"Heavens!" stuttered Huxhold. "Now I know that I'm crazy! She's learned to talk—already?"

"Yes." I let him shake my hand. "If you like, Huxhold, you can come up with us."

I can only believe that what was to happen was fated, foreordained. Else, why did no intuitive sense warn me against the invitation that I had extended to Huxhold? I gave it, unaware that it was to lead to something which would seal Naomi's doom, and mine.

Huxhold stayed late that night. He dropped in every evening following. And I, meanwhile, went ahead with my education of Naomi. How I loved her!

Her voice in my ears was like song! The gentle touch of her hands, her manner of suddenly throwing both lovely arms about my neck and kissing me with soft pressure of lips as red as cherries, as

fragrant as hyacinths, always brought the hot tears of happiness to my eyes! How I loved her! A dozen times a day I swore my servitude to her, and renewed my vow of protectorate. And my heart threatened to burst when my name, uttered in her inimitable, sweet way, came from Naomi's lips! "Wal-ly!" she always said.

CHAPTER VI

Huxhold's Treachery

BUT Naomi's attitude toward clothing was that of a savage. It seemed as though she thought it was very odd for anyone to have to cover themselves with garments! Nakedness had no meaning whatever for her; anymore than it has to a South American Indian, who has lived in the open all his life without coming to consider body-covering a necessity! Naomi was wholly innocent.

While she was in the confines of my workroom and apartment, what she wore did not matter. One watching her did but watch the loveliest being on earth. Yet I thought it best for her to wear garments of some sort; and I had a knee-length robe of sheer grey chiffon made for her. This, and sandals on her feet, with the ropes of jewels and bracelets I had given her about her throat and arms, and Naomi's mischievous habit of tucking a rose in one side of her dark, fluffy hair, made her appear more than ever like a lovely princess of some far earlier period.

"Naomi, Naomi!" I would catch myself saying. "I love you!"

"Oooo!" she would answer, delightedly pronouncing her first sound of all. "I love you, Wal-ly!" And again I would feel her intensely sweet kisses on my lips!

Professor Carl Huxhold, demon spirit of awful, evil genius, continued to be a regular evening visitor. I did not guess what was happening before my very eyes, nor what was to be his propensity in revenge when he was thwarted! No—I was blind; blind, and possessed of no judgment in character whatever, or I should not have failed so in my vow to protect Naomi!

Now I see what I was insensible to then. Now, I realize that Huxhold, the vile beast, was striving to ingratiate himself in Naomi's favor, *was making love to her!* Believing, because she was lacking in sophistication and acquaintance with men of the world, that his pretty talk and a veneer of manners over his bubbling purpose would wrench Naomi's affection from me to him!

Thoroughly disillusioned was Huxhold to be; and I should have killed him then! Before his brain, flaming with a jealous, insane hate, evolved the malevolent atrocity which was his objective!

Four nights ago, returning from the phone instrument in the lower hall, after leaving Naomi alone with Huxhold in my living-room no more than five minutes, I sped lightly up the stairs and halted even as I opened my door!

Huxhold had his hairy arms about Naomi! He was striving to plant his gross brutal lips on her clean, beautiful mouth! Naomi, terror mirrored in her eyes, fear tightening the muscles of her face, was working to fight him off; and Huxhold had torn the filmy grey chiffon from her body!

"Wal-ly!" cried Naomi. "Wal-ly! He—hurts!"

Then, twisting aside, she managed to get one arm free of his grasp. Slap! Slap! Slap! Furiously angry, three times Naomi brought her hand in violent contact with Huxhold's right cheek! Knocking off his pince-nez, and sending him, half blinded, reeling back!

"You damned vixen!" Huxhold shouted. And—

Then I had him! With my hands on his collar, I so savagely jerked him about that his coat parted in one mighty rip! I slashed my fists into his face, pounding his nose, and eyes and mouth! I drove home smashing blows, propelled by a red rage! He could not withstand me!

And Naomi, a glorious creature of brilliant blue eyes, nude except for sandals on her feet, the swishing ropes of beads and jingling bangles, danced about us like a veritable savage, voicing "Oooos!" of delight!

Naomi would have leaped upon him, as he lay senseless and supine, finally, on the floor; but I restrained her.

"No," I said. "No, Naomi dear, it is enough!"

Then I dragged Huxhold into his laboratory. I dumped him on the floor, and as I turned to leave his eyes opened. Deprived of his glasses, his eyes inflamed from the effects of my blows, he could not see me clearly; but he muttered: *"By seven hells of devils, I will get even, Land—for this!"*

"And I will kill you, Huxhold! As surely as you ever cross my path again!" I answered his threats. Feeling a little sick, I returned to my living-room and Naomi.

Huxhold's Revenge

CAREFUL as I was after that, it was useless. I did not dream of the direction that Huxhold's implacable vengeance would take. A telephone call—to get me to leave Naomi an instant unguarded!

An hour and a half ago, it was. And perhaps it was Naomi's womanly intuition of inhuman dangers pending, that caused her to leap up from beside the little tea-table where we were in the midst of dinner, and clasp me tight to her breast in an embrace of love while her honey-scented lips rained dear, tremulous, but fragrant kisses on mine!

"Wal-ly!" she murmured in a voice that was heaven-made music to my ears. "Wa-lly—I love you so!"

And I answered her kisses, and breathed answering assurances of love to her; and went into the hall and down the stairs with hot tears of happiness misting my eyes!

I had lifted the telephone received when I heard Naomi scream!

(*Continued on page* 83)

The Threat of the Robot

By David H. Keller M.D.

He was given as a present to the city. He had an automatic eye which was extremely sensitive to light. A beam of light shone persistently into his eyes so that when a car crossed this beam, he moved his arms in such a way that the traffic signals were changed.

CHAPTER I

The Return of a Wanderer

DAVID H. KELLER, MD.

"WOW!" exclaimed the middle aged giant. "What luck to arrive just in time for the big game of the year!"

Ed Ball had not realized how timely was his return to New York till he began reading the sporting page of the paper while waiting for his breakfast. Gazing at the advertisement, oblivious of his surroundings, he recalled the last game of football that he had played in such a brilliant fashion twenty years ago. For three seasons he had played a remarkable game, and then had graduated and left New York for the far places of the earth. He thought about that last game, how he had personally made most of the score, and finally ran off the field amid the plaudits of the eighty thousand spectators.

For twenty years he had explored places where the white man was almost unknown, hunting for reptile eggs in Asiafa, King Solomon's lost cities in South Africa, and rare fossils in Australia. He had deliberately left civilization and he knew more of the world of twenty five thousand years ago than he did of the world of today.

Finally he awoke to the fact that he was past forty and that it might be a good idea to return to New York and see how his various investments were progressing. Without planning to do so, he had arrived in the Metropolis the night before the great game between New York and Pennsylvania. He had not realized this until he read about the game in the morning paper. No wonder he was excited!

The newspaper account of the game looked peculiar, but he simply thought that it was some modern slang with which he knew he was rather unfamiliar. He propped the paper against the coffee pot and read:

"Pennsylvania Places Powerful Team on Field Against New York.

"University of Pennsylvania promises to place powerful team of football robots on field this afternoon against the crack team of the University of New York. The Pennsylvania experts claim a degree of mechanical ability for their players never surpassed in the history of football. Twenty million persons expected to witness the game. Stop work and tune in on W2RX. Permits cost only one dollar. Why work when you can be entertained? Sit at home and see the sport of Kings, the contest of a century. This game decides the Inter-University Robot Championship of the country and will certainly be worth seeing. The mechanical experts of the greatest colleges in the East will stage a battle of skill, wit and brawn. Be sure to tune in on W2RX. One dollar is all it will cost to entertain the entire family."

Ball called his waiter to the table. Pointing to the paper, he asked what W2RX meant.

"That is the television broadcasting station code number, sir," was the polite reply. "But you need not worry about that so long as you are a guest at this hotel. The management is glad to furnish this service free to its guests. At three o'clock this afternoon just go to your room, sir, and tune in, and if you are not an expert, just call for one of the bellboys, and he will be glad to get W2RX for you."

"And what will happen when he does get W2RX for me?"

"Then you will see the game. I understand that it is a very good game, though I do not care much for sports myself."

Ed Ball gazed at the waiter in astonishment. "You don't mean that I can see the game from the hotel?" he asked.

"Certainly. That is the way almost everyone does nowadays. I understand that the spectators used to go out to the field, sir, but that was before my time."

There was a lot about this that the former football star did not understand, but as he did not want to betray his ignorance to the waiter, he dismissed him and finished his breakfast. Business matters occupied part of the day, but by two-fifty Ed Ball was at the main gate of the stadium of the University of New York, which certainly looked very much as it had looked twenty years ago when he was at the height of his fame. That is, it looked very much as it used to, as far as stone and cement and location were concerned. It was very much unlike it in every other way. In the first place, there was no crowd. A few men were lounging at the gate, but the eighty

THIS is the age of the "robot." On every hand we meet a different mechanical wonder that directs some activity, which heretofore was accomplished by human labor. Some of these machines are veritable marvels of cunning and ingenuity.

Indeed, some of them perform the task better and quicker than human beings ever could. Whether it is a tide-predicting machine, whether it is a machine that controls traffic in our big cities, whether it is a billing machine, or an automatic block signal, or whether it is a robot which closes all windows of your house as soon as it starts to rain, makes little differ-

Robots are all around us and it will not take many years until such a machine, so vividly described by our own Dr. Keller, will come about. We will probably nod and wonder why the thing hadn't been done a long time ago.

thousand spectators that had thronged to see the game in years gone by were strangely absent. It was as quiet and peaceful as a country village. Walking up to the ticket office, Ball was surprised to find that there was no one there to wait on him; and, as the gate was open, he walked in without a ticket.

It was a wonderful day of the Indian Summer. The grass of the football field was green, the sky, blue. Nature was at her sunniest. Ball saw a small group of men in the boxes on one side at the center and a similar group on the opposite side. There were some large, peculiar boxes placed at regular intervals around the field. So far, there were no players and practically no audience. Ball thought that he must be a day off in his chronology. He felt thoroughly uneasy; there was something uncanny in the stillness which was so different from the hungry roar that came from the assembled thousands when he was a player.

Walking up to one of the groups of men sitting in the stands, he asked casually, "When will the game begin?"

"In about ten minutes," one of the young men answered him rather pleasantly. "You see, we have to wait till W2RX has the air, but that will be soon. Our men will be out in a few minutes; the mechanicians are going over them for the last time now. Won't you sit down and watch it, sir? It is so seldom that we have actual spectators that we will be honored by your presence."

"Why—Yes, I guess I will," Ball replied slowly. "Which is the New York side?"

"Right here. You see, we are the real team, sir. Eleven of us and the substitutes," and he waved his hand so that about twenty-small studious looking men were included in his gesture.

"That's good," said Ball, rather astonished. "I am for New York. In fact, I used to play center on the team some twenty years ago. My name is Ball, Ed Ball, perhaps some of you boys have heard of me?"

The young men thronged around him.

"Sure, we have. Good old Ball! One of the old timers, when men were men. Why, you are one of our heroes, sir. Come up and sit with the team and watch us defend the honor of the good old Varsity. Things are changed now, but we are glad to have you with us. Your being here will put a lot of pep in the game."

The Great Battle

THEY stood around the giant veteran and made him feel thoroughly at home. Taking him into the stand, they gave him a seat of honor. "Right with the team, where you belong," they said. Then suddenly the silence was broken by a shrill whistle, and each one of the team became strangely alert and silent as he bent over a peculiar machine which stood on a table in front of him. For a few minutes Ball thought that the men had been kidding him. He felt sure that they were really newspaper reporters and that these machines were some new kind of telegraphic apparatus. Then the players appeared at each end of the field, lined up in the old position, the ball was kicked and the game was on. Ball was so much interested that he forgot the men sitting near him and their peculiar instruments.

The game was rather similar to the one that he remembered playing twenty years ago. The odd things that he saw he attributed to the change in the rules. Occasionally a player would be knocked out and the doctors would go out on the field to treat him. Each side seemed to play well but to Ball the silence was depressing. There were even missing the shouts of encouragement from one player to another. Even the collegians in the stands whispered to each other.

Finally, the quarter came to an end. Neither side had scored. The eleven New Yorkers stopped pecking at their machines and looked up. They were evidently pleased with the results.

"Well, Ball, Old Top!" one of the men exclaimed. "We held them that time. We thought they had some new inventions in their robots, but our men were just as good. The directing machinery worked perfectly, and our team worked in beautiful harmony. There will be a fifteen minute interval and then we will go at it again. It is too hard a strain on us to play more than twenty minutes at a time. We often find that the full four quarters of twenty minutes is very exhausting. You have no idea the amount of concentration it requires. Often I have seen a man faint."

"But those men seemed to be strong fellows," replied Ball.

"Oh! I was not talking about them. I mean the real team, the boys that are struggling here at the directing machines for the honor of our dear old college."

"Well, I'll be the goat!" exclaimed Ball, suddenly. "Tell me all about it. I have been in Asia and Africa and Australia for twenty years. I just arrived in New York last night. I have not tried to read a paper for years and years. Everything is changed, and I am either insane or you are. So, tell me all about it, and I will see what is the trouble with me."

But before they could begin to tell him about the changes in the football game, the whistle blew and each man rushed back to his seat. This time Ball was asked to sit near the center of the group, and, one of the men whispered to him rather hastily, to watch the robot who was playing center, as that was the player who was controlled by the little collegian who was the Captain of the team.

For a few minutes the game was even and then Pennsylvannia scored. The ball was again put into play and again it took only a few minutes for the visiting team to score. The New York players were being repeatedly knocked out; they began to run around the field in an aimless fashion, while the Pennsylvania eleven continued to play with

smooth precision. Ball looked around at the eleven men who were manipulating the type-writer-like machines; their faces were haggard; there was no doubt as to their worry. Finally, the quarter ended, with the score thirty-six to nothing in favor of Pennsylvania.

The New York players trotted off the field, but several had to be assisted by the mechanicians. At once the eleven men in the grandstand went into conference with the chief electrician.

"Something is wrong with the power!" that official announced. "In some way, the directing currents are being blocked and misinterpreted. Perhaps it is some new wave that the other team is using against us."

Just then several of the mechanicians rushed up and announced that three of the robots were completely out of order and that the old style machines would have to be used as substitutes. Consternation reigned.

It would be useless to tell the story of the rest of that game. Though the eleven little fellows in the grandstand on the New York side did their best, even working to the point of exhaustion, it was impossible to do anything with the conquering visitors, who finally ended the game to the tune of one hundred and thirty to nothing.

Ed Ball was too much of a gentleman to make any comments on the score, but he could not help recalling the old days when such a defeat would have been impossible, even for a small college. Though depressed, he was filled with a deep curiosity, and he decided to satisfy it by asking the team to take supper with him that evening. He had an idea that they would become talkative after the meal that he would provide for them at the hotel.

The season being over, and their period of training broken, the eleven men were free to accept the invitation. They suggested that the coach and the chief electrician come along, and Ball was delighted with the idea. So, it was quite a gathering that filled one of the private rooms at the Lostmore Hotel, the latest one hundred story hotel in the great city.

CHAPTER II

An Explanation

BALL found, to his delight, that the coach had actually played football in the old style; so, he suggested, after the coffee and cigars had been served, that the older man tell his story first. Sigmund Haggard was only thirty-nine years old, but in that time he had seen the entire system of athletics revolutionized in every way. He had been one of the last players and one of the first coaches for the new system and was eminently qualified to explain the change.

"The thing that started the trouble, Mr. Ball," he began, "was the popularity of the game. It did not make any difference how large the stadiums were built, they could not accommodate the crowds that wanted to see the big games. Finally, the authorities realized that the saturation point had been reached, as far as the size of the audience was concerned. The stadiums could be built larger, but, even as they were, a large percentage of the audience was so far away from the players that they had to use field glasses to get even a small idea of what was going on. Another thing that made an increase in the size of the audience impossible was the difficulty in getting them to their seats. Most of them thought it was necessary for them to come in their cars. And when one hundred thousand people arrive at an athletic field in automobiles, in an hour's time the congestion is frightful. There was no place to park the cars. It took hours to get to the game and hours to get away, and at every big game there were five times as many people refused seats as were accommodated. Even the graduates could not be accommodated, and that caused a lot of hard feelings and cost the colleges a lot of money because, naturally, the rich men did not like to give large endowments to schools when they could not get enough tickets for their friends to see the big games.

"Just about the time you left the country, television was beginning to make great advances. Of course, you were familiar with the moving picture and the combination of sound and picture in the filming of the so called talking picture. Television, you recall, attempted to carry images through the air by radio waves, just as the first radio carried sound. It was believed that the sound and the images could be synchronized as far as time was concerned. As well as I recall, they were just beginning to do this in a very simple way about twenty years ago. A man would stand in front of the broadcasting apparatus and made a short talk. His image would appear on the receiving plate a hundred miles away, and while the radio would broadcast his speech, television would reproduce the movement of his lips and his smile. I recall the first attempts that were shown in the theaters. A barking dog, a whistling train, a famous tenor singing a few notes, was as far as they could go. Later on, the technique was improved and the details of the images were made clearer, and, finally, the picture was projected on a screen, just as a regular moving picture and just as clear. About that time vaudeville players began to put on short sketches which were broadcast. It was really remarkable, the rapidity with which improvements were made in this new art.

"Of course, the financial effect on the legitimate theater was at once anticipated by the theatrical trust. By a clever manipulation of the market, they secured control of all the companies owning the original patents. They realized that television was inevitable and that it might drive the legitimate plays and opera out of existence, as the movie had theatened to do. So they decided to control it. They refused to sell receiving apparatus but put them in private homes for a small

yearly rental, plus a nominal charge for each performance they were used for. This arrangement brought them a good income, and made it possible for them to retain the services of their star performers.

"Besides, they started to broadcast other features, like parades, prizefights and tennis matches. Their charges were low, and they counted on the volume of business to bring returns. For example, this afternoon's football game cost each person who had one of the television screens one dollar for the privilege. Of course, as many persons as could crowd in a room could see it for that dollar. Out of that dollar, thirty cents goes to each of the teams and the remaining forty cents to the company.

"The effect on the theater was at once seen, but no one realized just what this invention would do for sports. It seemed that everybody arrived at the same decision at the same time: namely, that it was easier to stay at home and see a prizefight or a tennis game for a dollar than it was to fight the crowds and pay anywhere from five to fifty dollars for poor accommodations. The attendance at all the sports fell off in an astonishing manner, and the various promoters would have been bankrupt had it not been for the generosity of the television companies. They could afford to do the square thing, because, while the actual attendance at the games fell off, the interest in the sports increased, and, finally, instead of seventy thousand people seeing a prize-fight, it was estimated that as many as fifty million people all over the country would stop everything and see and hear the fight in their own homes at the same time and at the small cost of a dollar a home.

"The time came when complete performances of an opera would be given in an opera house, without a single spectator. For the opera could be broadcast in the air to the owners of the television receiving screens. And the same thing rapidly became true of the sports. It may seem rather strange to you, but the last heavyweight championship fight took place with less than a hundred spectators at the ringside, and the two men fought just as fiercely as they used to, because they knew that an audience of fifty million were watching them.

"That is why there were no people out to watch today's game, Mr. Ball. Actually, there were millions who were carefully watching every play, but they were in their homes or in a hundred thousand small moving picture theaters all over the country. They are still interested, but they prefer watching the game in comfort."

"Well, that is almost too much for me!" exclaimed Ed Ball. "I have seen and heard some peculiar things in the out of the way corners of the earth, but nothing like that. Now, how about the game that I saw today? What kind of a game was that, anyway? And what kind of players had you? And by the Seven Sacred Purple Cows of Benares; what were those funny little typewriters you boys worked over so hard?"

"I will tell you about that part," said Rudolph Drach, the chief electrician. "The new game really falls into my field of science. Of course, Haggard has been telling you about the importance of television, and there is no doubt that it is important, but there would be no football game to show these millions of television fans if the electricians had not perfected the robot into a real football player. The game as it is played now has grown from a small beginning into something that is nearly mechanically perfect and, of course, this development has been caused by the inventions of a great many scientists. But really I was the man who first proposed it and put the first robot into uniform."

"Well, what is a robot?" interrupted Ball. "I suppose I seem rather ignorant to you fellows, but I have been away from civilization for twenty years. So start at the beginning and make it simple; am I to understand that those players today were just some kind of funny machines?"

New Beginnings

"THAT'S it exactly," Drach said quickly, "a robot is a complicated machine, made up of batteries and motors and springs. The first one was brought to New York from London in January, 1929. It was a rather crude affair, but it could walk and talk and obey a few simple commands. It looked like a machine—in fact, no one would mistake it for anything else. It has some radio apparatus in it, and the vibrations of the air by the voice would cause the radio apparatus to operate and set in motion a motor. By this means the machine man would wave his hand, start walking, or begin to deliver a speech which, of course, was nothing but a cleverly arranged phonograph in his interior. There was a great deal of excitement about it, but in a short time that died away, because the machines became so common that they lost their thrill. About a year later I had a great deal of trouble in finding the right kind of a center for my football team, so I conceived the idea of using a robot just for practice. You see, I had played football while studying electrical engineering, and I thought I could coach for a few years to help out with my family expenses. I built this robot, geared him up to bend over and snap the ball back between his legs and to buck the line and a few simple movements. I would stand near him and shout the signal, and at the proper sound he would make the desired movement and then snap back into his normal position of bending forward with his hands on his knees. We made a fighting face for him, put him in football togs, and he became quite a favorite with the team. I found out that he was better than any center I could develop because I could always depend on his doing the same thing at the same time in exacly the same perfect manner. He was a tireless player. Later on I taught the quarterback to

give him his signals, put heavier rubber muscles into his arms and legs and used him in practice games with the scrubs. Later I made two of them, and the boys were wild with delight over seeing the two machines plunge into each other.

"Then television began to hurt us. Coach Haggard told you about how it killed the attendance, but he did not explain how it hurt the game of football. Of course, two prizefighters might be willing to kill each other without an audience because they were making a half million or so out of it. But these college boys were playing for the applause, and when they stopped they just quit coming out for the team. This was especially true of the heavy men. The little fellows enjoyed the spectacular running and throwing the ball, even if there were no one to see them. But the big fellows did not enjoy having their bones broken without anyone there to see it. We just had to have teams and games. We needed the money to finance our athletics. So, I proposed to some of the colleges that we secretly substitute a few robots to play center and fullback. We worked the plan for two seasons without the public tumbling to it. There were eleven players on each team, and the real men and the machines were almost undistinguishable.

"Of course, they had to be handled rather carefully. The matter of their signals was a most important one. If the opposing side learned these signals, they could give them at the wrong moment and confuse the whole play. This was not considered sporting, but it was being done at times in the stress of the battle.

"It remained for a final invention to revolutionize the game of football. Electrical multiple-superimposed wave lengths were being studied more carefully and used in more peculiar and unheard of ways. One inventor startled the nation by setting a small gasoline launch out to sea, with the engine going, but no one on board. He directed the movements of this launch from the shore by sending wireless waves to a mechanism which moved the rudder. Three miles out he turned the little ship around and guided it safely back to the shore, even turning off the gasoline engine at the proper time. In a similar manner, automobiles were guided, with no one at the wheel, and even airplanes were controlled. The possibilities of such a governing of moving bodies were tremendous. Suppose five hundred planes were sent over an enemy city each loaded with high explosives, and when a certain button was pressed on the switchboard at home the entire load of TNT would be dropped on a defenceless city? An entirely new kind of warfare would ensue. Suppose robots guided by radio were sent forward to attack an enemy's position?

"But all these possibilities have nothing to do with football. At least, not as far as my telling you about it tonight. You are interested in the game and not in warfare. So, I will simply say that I began to experiment with the control of the movements of a football robot by electrical waves rather than by the spoken voice. I had several enthusiastic students help me, and at last we had the satisfaction of seeing a robot out on the field do practically everything that a man can do, and entirely under our control. We made a governing keyboard, the final evolution of which you saw today. Pressing one key made the robot raise his right arm, while another key started him running. By holding down that key and pressing another one he swerved to the left.

"As a machine, it was practically perfect, but in itself it had no intelligence. It was still necessary for the human mind to guide its movements. So, it became our task to select men and train them to use these machines; to sit in the grandstands and work the governing keyboards in such a way as to get one hundred percent efficiency from the robot ball players.

"We found that to properly work one of the machines required a very high grade of intelligence. And when it came to selecting eleven men who could work as a team, in perfect harmony with each other, so the eleven robots would act as one well-run machine, why, that was an almost impossible task. It was soon discovered that the best type of collegians were little men with clever brains. Chess and bridge players made good players, if they could be trained to use their hands quickly enough. Some of our best men have come from the music schools as violinists and piano players.

"Finally, the grand idea occurred to me. The television audience did not care much whether the players were machines or men, so long as they saw a real fast and interesting game. It became more and more impossible to obtain real players, so why not form teams of eleven robots and have the intercollegiate competition consist of the skill in making faster and better robots and in training a team of eleven undergraduates to work at the keyboards. I proposed that plan ten years ago, and it was enthusiastically adopted as a new game. But it was so superior to football that the old game was abandoned, and the new game received the old name. The papers now speak of the students who sit at the keyboards and the undergraduates who are able to build the most perfect machines. We still have coaches, but the electrical expert at every big college is the big man, and he is praised or blamed for victory or defeat."

Ball Makes a Plea

"WELL, you were badly defeated today," growled Ball, who was still suffering from the humiliation of seeing his Alma Mater so badly trounced.

"We sure were badly whipped," agreed Drach. "Honestly, I do not know what did happen. I think, though, they have found some new wave over at Penn., and they used it today to disturb our governing currents. Some of our robots were badly burned, and one was entirely ruined inside. Personally, I am glad that the season is over. It has been a hard one on all of us, and these boys

who have been sitting over the keyboards every Saturday, are rather well shot to pieces, as far as their nerves are concerned. It has been a fairly good season, and I guess we made over five million for the University, enough to put up a new building. At the same time, it is hard work, and I doubt if it is really appreciated by most of the college. Of course, we are burned out. But we will get our pep back, and by next spring we will be putting in long hours in our experimental laboratory, building stronger and better robots. We will find out what Penn did to us, and we will learn how to block those waves and perhaps hit them with a new wave of our own invention."

Ball looked at the two older men and then at the group of small collegians who had borne the brunt of the football season just passed. Then he had some pre-war stuff passed and proposed a toast to the good old college.

"I used to fight for her, boys," he said. "I used to go out there and play like those robots you worked this afternoon. I recall the men who played with me, and I guess that we did not have between us as much brains as one of you little fellows have. But, by the Seven Sacred Pigs, how we did run and fight and sweat for the honor of the dear old school! I was not very much impressed with the game today, as a game, but I did admire your fighting spirit. Even when you knew you were licked you kept on pounding at those keys. So, I am strong for you, and I really love you, because, even though we are twenty years apart in time and about two thousand years apart in our ideas of real sport, you sacrifice everything to win for your college just as we did years ago. It is the same spirit, so, let's drink to the dear old school, and to her success in the future."

After the team left, Ball took the coach and the electrician to his room for a final talk.

"What I want to say, men," he began, "is just this. What Penn did to us today was not sporting. As I understand it, they just about ruined some of our machines. That looks like dirty football. How about it?"

"It is all in the day's work," replied Coach Haggard, shrugging his shoulders. "Personally, I have always held out for straight machine football and no tricks, but Drach thinks they have a right to use any thing new that they are able to discover."

Ball looked at the electrician, questioningly.

Drach drummed on the arm of his chair and finally replied.

"It is rather hard to tell just where the line can be drawn. I, personally, see little difference between disabling a machine by a new form of electric wave, and putting a human player out of the game by hitting him on the jaw. They say the game used to be rather rough when you played it, Mr. Ball, and you saw from today's exhibition that it is still rough. Only today machines were hurt instead of men."

The three men sat silently puffing on their cigars. After a long pause, Ball started to talk.

"I can talk a dozen foreign lingoes better than I can English, but I have something I want to say to you men, and I hope I can make you understand it. I believe that when you put machines in to take the place of men, you caused the human race to lose something. I am willing to admit that college sports were rather commercialized and specialized. And there is no doubt that, as exercise, it reached only a small percentage of the undergraduates. But they all went out to see the game, and they cheered and held snake dances and rallies, and the game meant something to them. It was a part of their life, it drew them together, it gave the old grads something to talk about and an excuse to come back to college once or twice a year and renew their youth. You have killed all that. Why, even the undergraduates do not come out to support their team, but prefer to see the game in their rooms or frat houses. There is actually about as much interest shown as used to be shown in the old days when our team played intercollegiate chess."

"At least, we are making money," pleaded Haggard.

"Money is not everything," retorted Ball. "I have so much money that I have not the slightest idea how much I am worth, and yet I have spent the best twenty years of my life collecting old eggs and bones for our museum. It is just a game to me, and I have played it just as hard as I used to play football. You say you made five million this season for the University. I could give you that much and not know it—but in all this I am thinking of men and not money. It looks dangerous to me, because there is no telling where it will stop. Suppose we have men to represent us in sports, machine men, and the same kind of machines to do our work for us. I can even imagine a golf game between two robots, directed by the experts from the gallery of the club house. We shall be apt to lose the use of our muscles. Look at those poor undergraduates who were on the team and had supper with us tonight. They may be brilliant at pounding the keys, but they could not even make a success of a half hour's setting-up exercise. They are weaklings, and the whole nation may become like that. How about it? Don't you think that something can be done to bring back the old days when men were men and gloried in the actual fight and conflict of sport, just for the love of it?"

"I do not think so, replied Drach. "This is a machine age, an age of electricity and radio and television. We are up in the air in every way. Our bodies may suffer, but our minds are certainly expanding. Think of ten million amateur radio experts in the United States! Think of the millions who can repair their own automobiles or airplanes! No one walks anymore. The pedestrian as a race is doomed. So is everything that is old fashioned. We are living in an age of jazz. You have a good room here. Have you tried your television sheet? Probably did not know you had one, did you?

Here it is over on this apparently blank wall. Let me turn off the lights and tune in for you. Do you like opera? I can get some good heavy opera from Berlin, or, perhaps, you rather see the Follies or a good Burlesque show. How about it? They are playing cricket over in Australia and I can get that for you."

"Let's see a good song and dance show for the tired business man," suggested Haggard. "I hear that the show, "ADAM NEEDS A MADAM," is worth seeing."

CHAPTER III

An Ominous Dream

So Drach turned off the lights and tuned in on the musical comedy. And for the next two hours the chorus girls pranced and danced and sang, and they were seen and heard just as well in the hotel room as they would have been in the best seat of the old time theater. Then, pleading fatigue from the excitement of the day, the coach and the electrician left their host, after the television screen had been disconnected and the lights turned on.

Ball was unable to sleep, so he sent down stairs for the evening paper. The bell-boy who brought it explained that he could obtain very good current news service by tuning in on GYX on the radio, but Ball preferred to get his news in the old fashioned way. The very first article that he read irritated him. It gave a full account of the mechanical traffic policeman that the New York Electrical Society had finally perfected and had given, as a present, to the city. This traffic robot had an automatic eye, which was extremely sensitive to light. The change from light to shadow set the arms of the robot in motion. He was controlled by a beam of light which shone persistently in his eye. When a car crossed this beam of light, cutting it off from the eye, the robot reacted by moving its arms in such a way that the traffic signals were changed, thereby allowing the automobiles causing the change to proceed. The signals were changed again only when thirty seconds of the uninterrupted shining of the beam in the robot's eye had passed, thereby allowing all the cars on that street to move on. It was really an ingenious device. The article finally became rather humorous, and suggested that, with additional improvements, it might be possible to make a police commissioner out of one of these robots.

Ball went to bed, thoroughly irritated with his first day of actual contact with the new world. Instead of finding comfort and relaxation in sleep, he was simply tormented with unpleasant dreams. He thought that he was living in a world in which the conflict between the machine robots and the worker was so intense that unemployment was a serious problem. In practically every phase of life the machine was crowding the workingman out of his job. The robots were selling tickets in the subway stations, directing traffic, digging ditches, building new skyscrapers, forming new and unheard of additions to the army and navy. And some of them, connected to adding machines, and to typewriters in large offices were actually keeping sets of books and doing part of the stenographic work in a purely mechanical way by very capable machines.

In these dreams, Ball saw the gradual starvation of society, first, for the real pleasures of life, then, for the comforts, and later on for the actual necessities. He visioned parades of unemployed workingmen, demanding of capital a right to earn a living. But these very parades were policed by robots with blue-coats on who were very perfect in preserving order by mechanically-wielded batons. In his dream Ball saw one strike a poor woman on the head. The baby that she carried dropped out of her lifeless arms and would have fallen to the pavement, but Ball caught it with one hand and struck the robot in the face with the other. At once he was the center of an attack from a dozen machines who pounded him into insensibility. As he fell, he tried to save the child, crying in his terror, "You are killing civilization instead of the man."

But, instead of hitting the concrete, he floated into the air, and the child turned into a football. Seeing that he had on the old football armor of former days, he plunged madly through the gathering clouds to make a touchdown. Helping him were two of his former friends who had died. They whispered to him that he could save the world from electrified machinery if he only wanted to. So, with their help, he plunged through a rainbow, and, with the tattered fragments streaming over his shoulders, he made a touchdown at the great White Throne and awoke with a harsh cry of victory. Dazed, he made his way to the shower bath and tried to recover his senses under its stinging spray. Then he partly dressed and sent for a bell-boy.

"Start this television apparatus and show me how it works," he commanded. "Go slow and give me all the details and teach me just how I can call the different stations and find the programme in the paper. You telephone down to your Captain that you are going to be busy for the next few hours."

And for the rest of the night he and the bell-boy worked at the television machine till Ball was thoroughly familiar with it. It was daylight when they finally stopped. Immediately after breakfast Ball took a taxi for the sales office of Robots International. There his letters of introduction gave him a very satisfactory interview with the manager, who went into great detail as to the future of the company and just how their mechanical men would replace human labor. It ended with Ball buying ten million dollars worth of the capital stock. As he was leaving the office, the manager took him into a private room. A young lady simply but elegantly dressed was waiting there in a chair. The manager smiled.

"I understand you are a single man, Mr. Ball. We made a few of these dainty feminine robots just for men like you. I would be glad to give you this one. She can dance, has a good line of modern slang, can smoke and in the privacy of your hotel room can entertain you in many ways. It will take about a half hour to teach you how to handle her. Will you take her with you?"

Ball blushingly refused. He was a pronounced mysogonist, and the manager could not have made a greater mistake, than suggesting such a companion to such a man.

"That is just one more reason for fighting this dreadful mechanical age," Ball growled as he rushed down to his taxi.

Ball Takes a Hand

FOR many years Ball had possessed a one track mind. When he started to hunt reptile eggs in central Asia, he kept on till he had made a thorough success of it and had presented practically all the great museums of the world with almost perfect specimens. He had gone into all his explorations with the same enthusiastic determination. This was not the first time that he had come into conflict with men who might become his enemies. Danger was no obstacle to him, in fact it simply made him more determined than ever to succeed.

His first ambition was to secure recognition as an important stockholder in Robots International This he had easily done by the investment of only ten millions. Then he became interested in television stock and soon owned a large block, not nearly enough to give him the control, but sufficient to have him at once elected to a place on the Board of Directors. Then he secured the services of the best electrical engineers that his wealth could hire and told them to go to work with Rudolph Drach and build a real robot football team for the next season. He told them to spare no expense, but produce a team that could tear the Penn team to pieces.

For years the riches of Ball had been unrecognized. Now his large purchases of stock and his interest in mechanical sport made him an almost daily news feature. It was discovered among other things that he was the third richest man in the States, that he was a widower, that he was engaged to marry, for the first time, that winter; that he would never marry; that he had a wife and three children. To all of these rumors he gave the same reply; namely, that he was a mysogonist. This attitude introduced the word for the first time to ninety-nine percent of New York's population. As soon as its real meaning was understood, twenty-seven hundred unmarried belles of society determined to marry him before the year was over.

Meantime, Ball was busy. He was apparently fond of the limelight in the daytime, but in the evening he had a peculiar way of disappearing. It was commonly thought that he was leading a double life, but no one had the nerve to suggest such a thing to him. He was now occupying a twenty room apartment on Park Avenue, where he was waited on by a number of wonderful mechanical servants. The only exception to this was the cook. In the kitchen Ball had to acknowledge that the robot chef had been a failure, and this discovery was a great disappointment to him, as he knew that mechanical cooks would find a never failing sales market and thus greatly increase the value of his stock in Robots International.

It was an open secret that great days were ahead for this company in the manufacture and sale of robots for every line of work. Labor was united in denouncing the entire programme of so universally substituting machines for men. But, in spite of this opposition, the money men who controlled the new companies, such as Robots International, Television, and Radio, were determined to go on with their programme and perform the manual labor of the world with electrified machinery in the shape of men and women, who would be tireless, errorless and wageless.

In spite of his great activity in business, Ball found time to enter into sports with the enthusiasm which marked all of his efforts. He forced his election to the Rules Committee of Inter-Sectional Football, and on that body put through some new rules. One was that no matter how a robot was injured in a game, it had to continue in that game without mechanical attention. He also had the time of the game changed to one period of an hour's duration, rather than four quarters of fifteen minutes. A rule was passed that no human being, in the way of a coach or mechanician, was allowed on the field during the play. His constant statement and argument was that if the robots were mechanically perfect, they should not need attention from human agencies.

All that winter there was an undercurrent of unrest seething in New York city. It was well known that Robots International was manufacturing robots on a large scale, but there were no actual sales, simply the placing of advanced orders. They announced in their advertisements that these orders would be filled the latter part of November of the current year, and gave as an explanation of this delay that it would take the large manufacturing plants that long to adjust their machinery so they could use the robots instead of human mechanics.

As the months passed, and more and more the laboring men saw by the handwriting on the wall that thousands and tens of thousands of their number would be thrown out of employment, the unrest grew. Ball had to bear the brunt of their abuse. Robots International was simply a company, but he, as a rich man and their largest stockholder, was a living, vivid personality that they could assail with their vituperations. Not only words, but bricks were hurled at him. The apartment house that he lived in was bombed.

Ball seemed to like it. He became verbose, and almost every week issued a statement to the news-

papers, showing the different ways that the companies he was interested in would benefit mankind and the stockholders. For one thing, he proposed that a large percentage of the school teachers be discharged and a television sheet be placed in every room of the public schools. Then the lessons for the entire nation could be taught from the television broadcasting stations by a few expert teachers, and thus there would not only be an increase in the efficiency of the teaching and a very desirable uniformity of methods, but the cost of teaching would greatly diminish, and, thus, taxes could be lowered. Of course, this suggestion made Ball very unpopular with the pedagogues all over the nation and concentrated their rage on the Television Company. The general public was beginning to think and to wonder whether all this advancement in scientific knowledge was really an unmixed blessing.

In the late spring Ball bought ten thousand acres of land near the Canadian border, ran a high wire fence around it, protected the fence with armed guards and called it in the newspapers his Experimental Station. While not a word was said as to the kind of experiments that were to be performed there, there was no doubt in the minds of the common people that in every way they would work harm to the laborer. At this time Ball was the best hated man in the United States.

His money and hired scientists had worked wonders with the robot football team of the New York University, and that fall they won all of the early games. It is true that they won them by rather narrow margins, because the meeting of two robots in the field was rather like an immovable force, meeting an irresistible body, but, still, the perfection of the University robots and the skilled handling of the governing machines by the eleven well trained collegians always managed to win the victory for New York. Meantime, all eyes were trained on the New York-Pennsylvania game, which was dated for the Saturday before Thanksgiving. As a singular fact, the new laboring robots were to be placed in operation the following Monday. Twenty-five thousand had been distributed, and each took the place of three men, working eight hours a day, for these robots were tireless, and a twenty-four hour day had been arranged for their activities.

CHAPTER IV

A Surprise

THE football game had been well advertised. Over sixty million persons were going to see it on the various television sheets of the nation. That Saturday morning New York city saw its worst riot since the Draft riots of the Civil War. Peace was finally secured only after the fire department had thoroughly wetted the maddened throng.

The most peaceful part of the entire city was the football field; there the usual few persons were in attendance. The two teams of robots were given their final oiling and electrical testing, while the eleven men on each side oiled their fingers and nervously practiced striking the keys of the machines in front of them. Coach Haggard and Chief Electrician Drach sat near them, with Ball between the Coach and the players. There were probably five spectators on the seats that had been built to accommodate eighty thousand.

Then the game began. It was to go on, according to the new rules, for one hour, and during that time only the robots were allowed on the gridiron.

Almost immediately a whispering arose among the eleven little men who were pounding the electrical keys for the honor of New York. Their robots were playing good ball, but they were not playing the kind of ball that they were being directed to play by the eleven players in the grandstand. They appealed to the Coach and then to the Chief Electrician, both of whom were powerless to help them.

"The only thing I can see to it," said Drach, swearing, "is that in some way some one has cut off our control and substituted a new control of his own. Those machines cannot think; they have to be directed in some way, and if they are not reacting to your commands, then someone else is doing it. It is entirely possible that Penn is directing them and is playing both teams from her switchboards. If that is the case, we are in for the worst beating of our lives. What do you thing about it, Ball?"

The great man simply yawned.

"Our fellows seem to be doing pretty well so far. Suppose we let them alone and see what happens. Of course, you fellows had better pretend to work at your boards, because we do not want the Penn folks to think that we are puzzled. Look at that New York man go through for a touchdown! Who ever it is that is directing our robots is our friend, or he would not have worked for that score."

And that was just the first score. The New York robots played with a skill and energy and fire that had never been seen before in any robot team. They ran circles around the Penn men, stood them on their heads, tricked them in every way, threw the ball, carried it, kicked it till the game ceased to be a contest and became a riot of despair for the Penn players. It was not that the Penn robots did not play well, but the fact that the New York robots played so much better.

When the game was half over, a thin stream of New York Undergraduates began to trickle through the gates, and gradually there were enough present to start cheering. They explained excitedly that the television apparatus had failed to work, no one was able to see the game in the frat or club houses, so, they had decided to come down to the field to see for themselves how the game was really going.

Finally, the game came to an end. The score of

one hundred and sixty to nothing only told part of the story. The Penn team had been outclassed in every department of the playing, and the best of the whole game was the fact that by the end of it over a thousand students were there to cheer the victors.

As the game progressed, Drach became more and more silent. He looked sidewise at Ball, but that worthy retained his placid appearance. When the game was nearly over, Drach touched Ball on the shoulder.

"Let's go to the machine room and look those robots over. They played a wonderful game. I want to see if they are hurt any," he said.

And, so, the two old men were in the machine room when the game ended and the robots trotted in off the field. They entered the room, an old trainer locked the door and then the eleven of them gathered around Ball, and, with interlocked arms and swaying bodies, gave a final cheer for the dear old University. Ball just stood there with the tears streaming down his cheeks. Finally he whispered.

"Well played, my dear boys! You did not forget a single lesson we taught you all during that summer in the Adirondacks. You won the game, but you did more than that. You have helped to establish for all time the supremacy of man over machinery. There will be no more robots on the football field. Next year there will be eighty thousand spectators out to see a real game between real men. Drach, how do you like the way my boys played? I had over twenty old football players help me train them, and, considering the fact that we did not have much chance to practice, and that none of the boys had ever seen a real game, I think they did rather well."

The Chief Electrician did not know whether to laugh or to cry.

"You have run me out of a job, Ball. There will be no work for me at the University from now on."

"You should worry. I'll give you double your salary if you will work for me from now on."

"But how about the television and the radio, Ball?" asked the puzzled master mechanic. "I can understand your substituting human players for machines, but what did you do to the wireless? Or was that just a coincidence? A freak of the atmosphere?"

Ball smiled.

"You will have to guess at that for a while. Too many folks are around here to discuss important affairs like television. Suppose you come and take supper with the team. I am entertaining them tonight, and, perhaps, we can talk after they fill up and go to bed. I suppose we shall have to fight the reporters on the way out. You and Haggard can do the talking. Of course, you had better put all the blame on me. It was not very sporting to treat the Penn team that way, but I wanted to give the nation a startling object lesson, and when the papers feature it I guess the whole world will start thinking."

What Happened

THE next day, Sunday, was one long to be remembered in the history of the nation. The fact that eleven men had won a decisive victory over eleven machines was only a part of the news that almost glutted the capacity of the Sunday editions. People bought papers who had not done so for several years, as the news broadcasting stations were not working. Something had happened to the radio; not one of the machines in the entire nation was working and none of the experts knew why. That in itself was news. Then the television broadcasting stations were out of commission, and that was more news. People had to depend for their news on the papers and content themselves with the telegraph and the telephone. That Saturday evening and Sunday they had to be entertained and, the few theaters still open did a record business.

Monday came, a beautiful day in Indian Summer. The calm of the season was felt even in busy New York. No one knew what was going to happen, and, yet, everyone felt that this quiet might be the lull before a deadly storm. Labor crouched, ready to spring in its last struggle against machinery. The twenty-five thousand robots had been delivered, they had been installed, the men whom they replaced had been discharged—and then—not a single robot started to work.

For some reason they were unable to even begin.

They were beautiful pieces of machinery, but absolutely lifeless.

Every day of idleness meant a huge loss to the manufacturers.

In despair, they called back their human laborers, increased their wages, lessened their hours of work, and hurled despairing questions at the owners of Robots International.

Those questions were never answered. All that the scientists could say was that the ethereal waves which made television, radio and robots possible were no longer at the control and the beck and call of mankind. Something had happened to them, not necessarily to destroy them, but to twist or convert them in some way, so that they no longer were capable of serving the caprices of mankind.

The next day, Tuesday, there was a joint meeting of all the Boards of Directors of the companies concerned in the gigantic change in the affairs of society. The meeting was called at the request of Ed Ball, but till he rose to address the Directors no one realized how large a part he had taken in the sudden cessation of television and the radio and other forms of activities, dependent on the wireless waves. Calling for attention, Ball stood up and told them all about it.

"Gentlemen," he began, "when I returned to America a year ago, I little realized the changes

in human life that were the direct result of your commercializing the inventions of science. I deliberately invested over thirty million in your various companies so I could gain a correct insight into the entire problem. I found that you had given to the world some blessings, but they were all tangled up with rather definite curses. You had made possible a vast extension of the use of the radio, television and the wireless control of machinery, which you dressed in the form of men and women and called robots. With these robots, you threatened the very life of American labor. You destroyed the best there was in sport, took away the pleasure of attending amusement in a mass, and, by placing all entertainments in the home, you turned mankind into a selfish, introverted, anti-social animal, who cared for little save his own entertainment. You did this to make money—there was little of the altruistic, the love of humanity, in your efforts to popularize these scientific discoveries.

"I prepared to teach the world a lesson by thrashing a football team of robots with a team of wide-awake young Americans. That was easy for me, because I was a former football star. It was different with the wireless waves of ether. Finally, I located an old inventor who saw this whole problem the same as I saw it. He was willing to work on the control of the wireless waves, and, finally, with my encouragement and cash he invented a little electrical machine, not much to look at, but rather gigantic in its power. Press one button and all these waves you use are dislocated, bent in some way so you cannot use them. Press another button and they are all returned to their former usefulness. We pressed one button when the game started the other day, and you saw what happened.

"This old gentleman who is sitting so quietly at my right is Mr. Henry Scherer, the brilliant inventor, who happened to hit on this new power. When he arrives at his home tomorrow he will press the other button and restore to you all your former control of the air. Whether he will ever press that button again will depend on yourselves. Your activities will be under the observation of a group of humanitarians, men who love their fellow man, and these men will be in my employ. If they think that your work is harmful to mankind, they will first warn you and then will stop you by notifying Mr. Scherer, who will press the appropriate button, Mankind must never again be threatened by the crushing weight of machinery. The robot must be the servant and not the master."

The next month Ed Ball sailed for Australia, leaving Scherer to protect American labor against any further onslaughts of the robot.

THE END

NEXT MONTH

The Problems of Space Flying

By CAPT. HERMANN NOORDUNG, A.D., M.E., Berlin

In the next issue we begin a series of serious articles (non-fiction), how scientists are already at work in the attempt to make space flying an actuality.

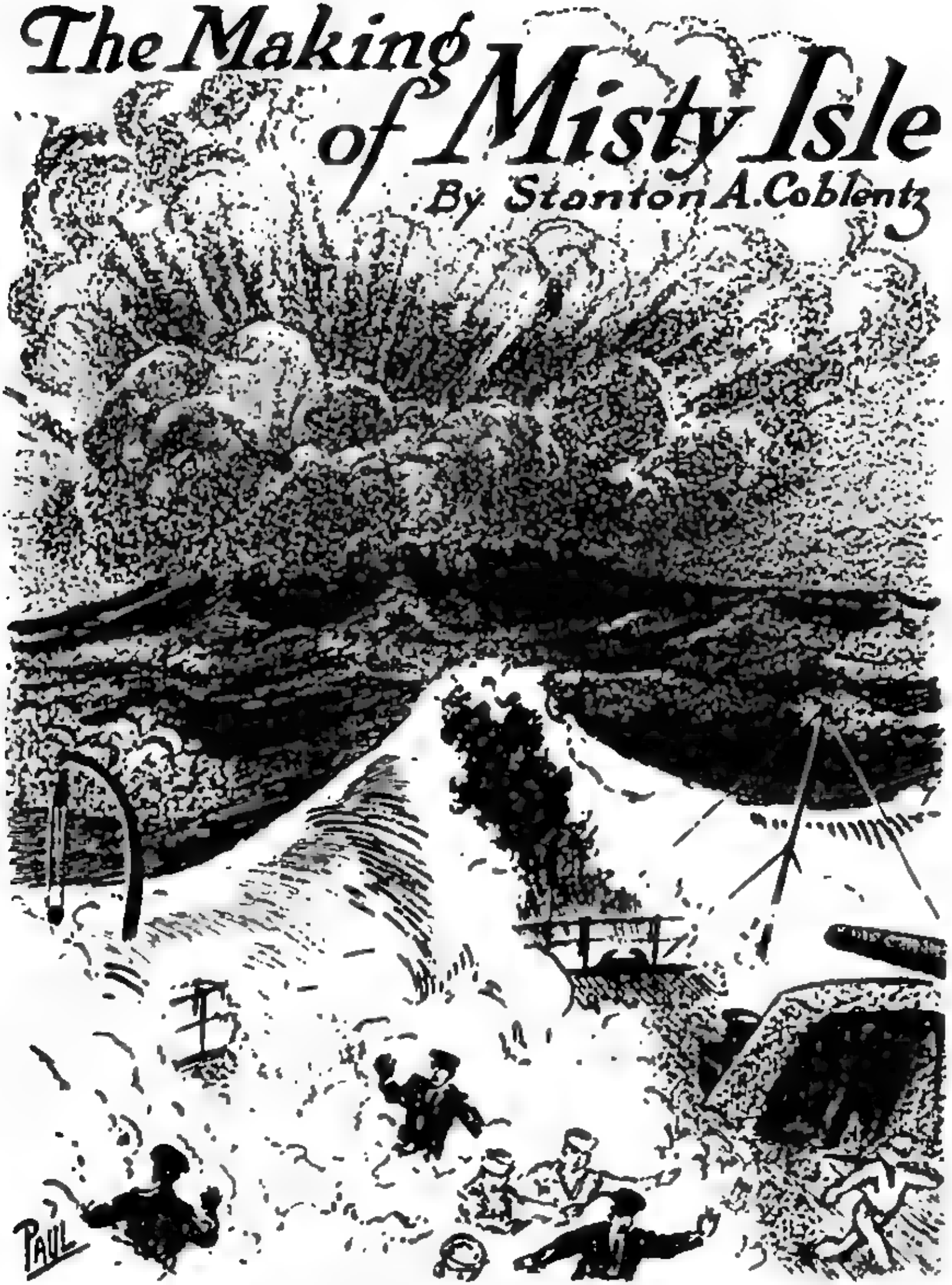
We have secured the translation and book rights for the United States of this most important work, just published in Germany by a famous German engineer.

For years, authors have written and exploited space flying by imaginary machines. Now for the first time, a great authority comes to the front and seriously discusses space flying and all its accompanying problems. Capt. Noordung has considered every problem in a thoroughly practical manner, yet the book is written in such simple language that a 12-year-old boy will have no trouble in following his reasoning. The articles are profusely illustrated. Incidentally, the author has made a number of new inventions and shows us how it is possible to tap the solar energy to make a space flyer comfortable, and at the same time use it as a weapon for warfare, more terrible than any conceived by man.

It is the most revolutionary work on the subject that has ever appeared in print and will be hailed from one end of the world to the other. Do not miss it.

The Making of Misty Isle

By Stanton A. Coblentz



Once more some power from the unknown reached out after the ship; once more a wave of terrific intensity overtook it, sweeping across the decks and making the craft stagger like a reeboat... while above the fog-bound shore of the island towards after fountain of bloody flame was buried aloft.

CHAPTER I

Four Conspirators

STANTON A. COBLENTZ

WITHIN an oak-paneled office in one of the capitals of the western hemisphere, four men were gathered in sober consultation. Three of them were advanced in years, with the wizened looks, the crafty eyes, the confirmed cynicism of aspect common among elderly politicians; the fourth, a man not yet out of his thirties, appeared in some ways the shrewdest of the group, and in his large sagacious eyes there was a light as cold as that glimmering from winter ice. He it was who, with a chart unfolded before him, was addressing the small gathering; and they listened to him with intent, calculating glances as his fluent words came forth.

"Yes, Mr. President," he was saying, with a nod toward the grayest and most shrivelled of his companions. "The scheme is entirely practicable. And you, Mr. Secretary, and you, General Blackfoot"—here he pointed toward the two other men—"will have to agree. For ten years I have been working out the plan, and there is no engineering detail that my experts and I have not thoroughly weighed and tested."

"Then you mean," drawled the individual addressed as "Mr. President," "you mean that it will be possible to create an island artificially? And the procedure will be safe and efficient? We may contemplate the completion of the work within two years? Is that the idea, Mr. Turnbull?"

Turnbull nodded gravely.

"Beyond that," put in General Blackfoot, "may we be sure that the island will be in a position of strategic importance? And that the operations can be kept scrupulously secret?"

Again Turnbull nodded. "Just look at this chart," he requested, pointing to a spot somewhere in the northern Pacific. "You see here a location well off all the regular ship lanes. It is hundreds of miles from any known island, and yet not much over a thousand miles from the eastern coast of Asia. Now at one point, where we have investigated, the sea-bottom rises out of a tremendously deep trough to within fifty fathoms of the surface. This is evidently the peak of a submarine mountain—or, rather a submarine volcano. And it is this peak which we propose to elevate until it overtops the waves."

The speaker paused, and, with heavy fingers stroking his huge square chin, looked out across the long room with its neat, even rows of desks, its tall filing cabinets and high sectional bookcases.

"Are you perfectly sure no one can overhear us?" he whispered.

"Perfectly sure," returned the President, with a confident glance toward the barred door. "I gave advance orders to the Secret Service. There is no danger of spies."

A furtive light flashed into Turnbull's chilly eyes. "Well, then, this is what I should propose," he continued, in low, significant tones. "We will induce the legislature to vote an extra ten millions under the blanket term of 'military appropriations.' With those ten millions we will set about, in absolute secrecy, to carry out our scheme. The main thing, of course, will be to keep the facts concealed. When our island has been created, its uses will be many. It will be invaluable as a military center. It will serve as a naval coaling station; it will be a center for the harboring and re-embarkation of military forces; it will be indispensable as a submarine and aviation base, from which our undersea craft may harry Asiatic commerce and our bombing planes destroy the coastal cities. Then at last the conquest of eastern China or Siberia, or of Japan itself, will not be beyond our grasp."

General Blackfoot, had come almost to swords' rapacious glitter appeared in his small keen eyes. "A magnificent project," he approved. "Really, a patriotic service of the first rank. But I still am not convinced of its feasibility. You will have to make the first part of your plan a little clearer, Dr. Turnbull. Just how are we to lift this island out of the ocean?"

Turnbull smiled tolerantly, and explained, "As I was saying before, the idea offers no exceptional technical difficulties. The region we have chosen is not only volcanic, but actively volcanic, and innumerable reports, seismographic and otherwise, show that constant disturbances are occuring beneath the surface, indeed, the record of tidal waves alone would prove the occurrence of submarine volcanic eruptions. Now what does all this im-

MR. COBLENTZ can always be relied upon to do the unusual.

Volcanic islets that rise and sink periodically from the surface of the ocean, are no novelty, but the idea of manufacturing a big island by force controlled by human beings, would seem a new thought in literature. In any event, Mr. Coblentz gives us an excellent exposé of how it may be done, and incidentally, there is no good reason why, with a sufficient amount of financial backing, it could not be done.

If it is done, we hope in the interest of humanity, that it will not be done along the lines laid down by the author.

The story, nevertheless, makes most interesting reading.

ply Clearly, that not far beneath the sea-bed, there is an enormous vein of the molten rock, or magma, which is believed to give rise to volcanic eruptions. This overheated rock, together with tremendous quantities of hot vapor, is continually pressing upward in the attempt to escape; and only the opposing pressure of the solid crust prevents it from spouting forth violently. But occasionally the fuming torrents below, breaking through some fissure or fault in the earth, become powerful enough to overcome the pressure of the crust; and then we have a volcanic eruption. Such eruptions hitherto have been due wholly to natural causes; but there is no reason why they cannot be created artificially. If the crust above is weakened sufficiently, they can be produced almost at will. And it is my object actually to produce one—and to produce it beneath the sea. By means of a new super-explosive—'hyperblast' I call it—I will be able to blow away the bed of the sea to a depth of hundreds of feet, thereby diminishing the pressure upon the molten magma beneath, and enabling the white-hot liquid and the torrid fumes to break to the surface in an eruption of exceptional violence. The released material will be certain to pile up to a considerable height, surmounting the surface of the sea and giving birth to a new island. You may take my word for it when I tell you this can be done. As chief engineering consultant for the government, and the inventor of hyperblast, I have had the opportunity to test the project to the last detail."

An impressive silence followed this recital. General Blackfoot leaned far back in his swivel chair, a gleam of exultant interest in his ferret eyes; the President sat pulling meditatively at his thin shred of a grayish beard, for all the world like a ruminant chewing its cud. Only the Secretary seemed still not quite persuaded.

"This hyperblast of yours makes me wonder, Dr. Turnbull," he confessed. "How is it to be planted at the bottom of the sea? By divers? By submarine? Or are you to shoot it down with a powerful gun?"

The grim face of Dr. Turnbull brightened with just the suggestion of a smile. "You are becoming frivolous, Mr. Secretary. No, I should not like to try shooting the explosive down with a gun. My method, however, is simpler than that. Wrapped in waterproof containers, and weighed down with lead, the hyperblast will be dropped in neat half-ton packages from the side of a vessel. Dozens of such bombs will be released, all of them operating by means of slow time-fuses, and all calcuated to explode at the same instant. Needless to say, we will first allow ample time for the vessel to reach port. You may judge of the efficiency of hyperblast when I tell you that it is ten thousand times more powerful than dynamite. I discovered the secret of it quite by chance; it is made of a thorium oxide, associated with radioactive compounds; and its pecular quality is due to a method I have found for accelerating the radio-activity to the point ot explosiveness. By comparison with it, TNT appears like a child's cap pistol. Six or eight of the bombs would be sufficient to make kindling wood of the city of New York."

"Good!" declared the Secretary, with an enthusiastic nod. "Splendid! Then you have no doubt at all, Dr. Turnbull? Your new explosive can blow away the surface of the sea and release the subterranean forces?"

"Unquestionably!" affirmed Turnbull.

"Well, I for one move that we adopt the recommendation," urged General Blackfoot, rubbing his thin hands together as at some appetizing prospects. "I feel sure that the measure will make military history."

And he laughed a dry, sly laugh that had in it a faintly malicious suggestion.

"It will make world history," concurred the President, also laughing furtively. . . . "Well, then, if every one is agreed, I personally will point out to the legislature the need for higher military appropriations. The necessity for self-defense will be my plea. . . . No one except us four, of course, will know what the additional funds are to be used for."

And all four conferees smiled, and congratulated one another. And a few moments later, when they took their way out of the big oak-paneled room, it was with the stern and serious looks of men who contemplate momentous deeds.

CHAPTER II

Great Preparations

DURING the early months of the following year, the world was startled by the account of a gigantic disturbance in the northern Pacific. Seismographs from London to Tokio recorded an earthquake of exceptional intensity and of several minutes' duration; and all accounts agreed in placing the point of origin somewhere in the northwestern Pacific, at a spot not more than a thousand or fifteen hundred miles from the Asiatic mainland. For this reason, authorities concurred in connecting the earthquake with the tidal wave of almost simultaneous occurrence, which was felt from Hawaii to the Aleutian islands, and from the Chinese mainland to southern California. No one knows how many fishing smacks were overwhelmed, how many sailing vessels were swamped and capsized in that cataclysmic swelling of the waters, which sent the waves pounding into many an island village, which lifted great steamers and left them high and dry upon sloping beaches, which drowned by the thousands the inhabitants of coastal lowlands, and brought mourning and anguish to twenty nations. No one can calculate the losses; and, in the horror of that first unexpected shock, no one could trace the source of the clouds of thin dust and cinders, accompanied in places by sulphurous vapors, which were blown over half the surface of the Pacific, and far inland into China and Siberia, as though

from some wide-reaching volcanic outburst. Scientists, of course, were not slow to recognize that there must actually have been a volcanic disturbance—probably an eruption on some remote and uninhabited island well out of the ordinary ship-lanes. The one inexplicable fact was that, even after the passage of months, no island had been observed which showed signs of a recent upheaval.

But what the world generally did not surmise was that strange and strenuous activities were in progress at some unmapped spot in the Pacific. Where the charts designated no island, an island had come into existence—a bleak, black affair of jagged lava, six miles long and three miles wide, and rising in places to a height of seven or eight hundred feet above the sea. "Misty Isle" it was called by the few who knew the secret of its existence; and the name was well chosen, for the land was shielded from the possible sight of approaching vessels by a perpetual veil of fog.

The fog, however, owed its existence to none of the whims of nature. Had one approached to within a few yards of the shore, one would have observed a multitude of little pipes, from which torrents of steam continually hissed; and one would have seen that these pipes, connected with a central heating plant, extended completely around the island, discharging their vapors in such volume that the land was invisible a quarter of a mile away. From the point of view of sunlight and cheerfulness this may have been a disadvantage, since the mists and drizzly rains that perpetually overhung the place were a trial to all except the least susceptible of nerves; yet from the practical point of view, the darkness scarcely mattered, since work on the island could be pursued as well by electric light as by the light of the sun. And when—as happened now and then—the sneaking gray form of some naval collier, or some inconspicuous supply ship or transport, came gliding toward the shore, the hazes would always open miraculously, and the vessel would find safe anchorage in a little harbor cut out of the jutting rocks. It is said, however, that on several occasions an unwanted ship came blundering toward the shore; that once a Japanese tramp, lost in the fog, foundered on the outlying reefs, and that several merchant steamers and one Japanese gunboat, afterwards reported missing, came to grief among the uncharted shoals of Misty Isle. But whether the presence of these craft were deliberate or accidental, it is certain that no member of any of their crews ever returned to make public the story of his adventures.

It is certain, also, that had any such individual returned, he would have had a tale that would have made the world sit up with a gasp and a shudder. For the things that were occurring would have been sufficient to send a wave of apprehension from one end of the earth to the other. In spite of the heat of the cooling lava—a heat which, even after six months kept the temperature of Misty Isle hovering about the nineties—prodigious engineering activities were in process of completion. Almost every inch of the island's thirteen square miles was the scene of vigorous operations; the uneven surface of the land, the deep furrows and chasms, the ragged ridges and cones, had been smoothed down and made passable; a line of rocky fortifications was appearing along niches and eminences of the shore; an aviation landing field had been cleared in the center of the island; an artificial harbor for submarines and surface craft had been excavated; rude wooden shanties for the housing of thousands of men had been installed; a large concrete building for military supplies was being erected; a plant for distilling sea-water, and for engendering electrical power from the waves, had been established; an enormous depositary for coal had come into existence, and some of the black mineral was already in use to produce the clouds of steam about the island. As yet, of course, the designs of Dr. Turnbull and his associates were far from fulfillment; but the naval department, reporting in strictest confidence the progress of the work, informed him that all things were proceeding according to schedule, and that there was every reason to look for the ultimate triumph of his plans.

Ready to Strike

A YEAR later, another secret meeting occurred in the large room of the oaken panels. The same four dignitaries participated; they convened in the same sedate and earnest manner as before. One might, in fact, have observed in them the same expression of confident self-importance, of cynicism, and craft, and world wisdom. In the intervening twenty-four months, they had not changed except in one respect; about the eyes of all four there was a look of exultation that had not been there previously; and, as they conferred in whispers and from time to time slyly chuckled, they had something of the jubilant, gloating expression of beasts of prey contemplating a prospective victim.

"Well, Turnbull," declared the President, after taking care to see that the door was securely barred and that there was no danger of eavesdroppers, "the long-awaited moment has come! Misty Isle is in readiness. It remains only to make use of it."

Turnbull withdrew the cigar from between his heavy lips, and slowly made reply, "Yes, it only remains to make use of it. Before leaving the island on my last tour of investigation, I found every detail in order. My part is done. The rest is in the hands of the government."

Turnbull's three companions rubbed their hands in shrewd self-satisfaction, and the predatory gleam in their eyes became more pronounced.

It was General Blackfoot who broke the pleased silence that ensued. "I am sorry to have to confess, Dr. Turnbull, that I have always had one fear. As yet, of course, no one outside the inner circle sus-

pects what we have done. The two thousand workers—members of our naval and marine forces, who were transported to the island involuntarily—have never been allowed to leave, and all their letters have been censored. And so no inopportune word from them is going to spread the news. None the less, I have been afraid that some treachery among those in high command might betray our secret. For that reason, I have been anxious to strike, and strike in full force, and strike soon. It is an axiom of military strategy that the speed with which a blow is delivered——"

"Yes, yes, I realize all that," interrupted the President, with an understanding nod. "Do not thing that I, too, have not been anxious for quick action. The Secretary here will tell you that he and I have passed many a long night together working out the plans——"

"Indeed we have!" acknowledged the Secretary, scarcely permitting his superior to finish. And, drawing a small chart from an inner pocket, he unrolled it on the table before the eager eyes of his companions.

"This is the scheme," he continued, hastily, while the others bent over him with absorbed attention. "General Blackfoot and Dr. Turnbull may, of course, have amendments to offer. We will begin by sending two hundred bombing planes, of various types, by carriers to Misty Isle. At the same time, fifty submarines will concentrate about the island, and twenty battleships and cruisers, along with double that number of destroyers and colliers and a hundred transports, will proceed to the base, and will be coaled to capacity. All that will then be left to attend to will be the official declaration of war. This is a bothersome technicality, which none the less we may settle by arranging to insult the Japanese ambassador, or proposing such a vicious anti-Japanese law that Tokio cannot help protesting. I take it, of course, that Japan will be our first target. We can then follow at our leisure as regards eastern China and Siberia. The moment war is declared, it will be won; for, by that time, our bombing planes will be approaching the enemy's coast, and the discharges of hyperblast will not leave two stones standing in any of the important Japanese cities. Naturally, however, we will not cause any more damage than is necessary for strictly military purposes."

"No, naturally not," agreed General Blackfoot, with a low chuckle.

"It will be the most sudden and skillful invasion in history," proceeded the Secretary. "The blow will be delivered so quickly that no one will know where it comes from. The troops from the transports will finish up what our air forces and our fleet leave uncompleted. I propose that we strike immediately!"

"So do I!" seconded the General.

"Just one minute," counselled Turnbull, eyeing his companions speculatively. "It seems to me that General Blackfoot, before planning his campaign, should see the island in person. And so should you, Mr. President, and you, Mr. Secretary. I personally recommend that a man-of-war be commissioned to take us all for a brief visit of inspection to Misty Isle. After that, we will be in a better position to act. The delay will not take up more than a month, at most."

The three officials rubbed their gray heads thoughtfully, and a long discussion followed. But the arguments of Turnbull were persuasive, and little by little he made it plain to his companions that haste was likely to mean waste. And both the President and the Secretary ended by confessing a secret desire to see the island.

A few days later, the newspapers bore the tidings that the President, being overtaxed with the cares of office, had been ordered by his private physician to take a few weeks' vacation in absolute seclusion. Speculations as to his whereabouts were many, but nothing was known definitely except that his Secretary and General Blackfoot were to accompany him. At the same time, it was noted that Dr. Turnbull—as very frequently of late—was not to be observed at his offices at the National Bureau of Engineering.

CHAPTER III

The Inspection

THE two thousand marines and naval recruits busy with the routine of work and drill on Misty Isle, did not guess the identity of the four aloof and closely mantled individuals who, accompanied by an armed guard, made their way slowly among the barracks and the fortifications, pausing now and then to inspect some interesting detail or to give some order, but never overheard to make any except the most trivial remarks. Had any of the watching men pressed closely enough, however, he might have heard the visitors occasionally grunting in satisfaction, in wonder, in pleasurable anticipation; and he would have known that something nameless and mighty was being agitated in the minds of the inscrutable four.

In all respects but one, the island had met the expectations of the unknown dignitaries. With the planning and execution of the scheme they could find no fault; the harbor, the aviation field, the storage depots seemed to them to have been designed faultlessly; even the abominable climate, with the damp heat and the yellow electric light shining perpetually through a foggy glare, seemed to them necessary and consequently praiseworthy. But one thing there was that caused them some slight concern. On an outlying northern spur of the island, an unlooked for manifestation had been observed. A torrent of steam and boiling water had leapt up from amid the lava; and investigation proved that the rock, a few feet below the surface, had been heated to a white glare. Considerable annoyance and even a little alarm was occasioned by this lingering evidence of volcanic activity; but Dr. Turnbull and his experts, con-

ducted a careful examination, concluded that this represented but the last dying gasp of the eruption that had brought Misty Isle into being. None the less, one of the group, taking a pessimistic view, whispered in secret a prophecy that made the cheeks of his fellows turn pale.

But his remarks were greeted with vigorous denials, and in the end were discredited. And the preparations on Misty Isle went on much as in the past. . . .

Before the visiting officials took passage for home, they were to see those preparations reach the final stage. They were to see huge ships come gliding into the harbor like ghostly marauders, and other ships leaving like thieves in the night; they were to watch troops disembarking by the hundreds and the thousands, and marching into barracks made ready long in advance; they were to observe the unloading of guns and torpedoes and gas-masks and huge parcels of high explosive; they were to hear mysterious messages whispered in the darkness, and to catch sight of sentries standing guard on every hazy eminence; in their ears the tramp of training myriads was to resound, the sharp orders of the captains and lieutenants, the clicking of rifles and the thudding of bayonets as the recruits charged dummy targets; a droning of airplane motors was to fill the air, and now and then the dull bursting of bombs; while, within the secrecy of well guarded offices, ageing men in uniform were to pore over red-marked charts, pointing meaningly to spot after spot on the islands or mainland of Asia, and issuing orders to subordinates who stole in to them stealthily, and as stealthily disappeared.

At the same time, the four dignitaries were frequently to be seen in the vicinity of the island's well equipped wireless station; and many a message in a secret code was flashed between them and their home country. It may have been for this reason that, just before their visit drew to a close, strange and disquieting events began to agitate the world at large. With the unexpectedness of a blast from an untroubled sky, a diplomatic rupture appeared between two of the great nations of the earth. Japan, and that western empire which was the home of Dr. Turnbull and General Blackfoot, had come almost to swords' points—and for no good reason that any one could explain. Even to those who claimed to share in the secret, the source of the disturbance was somewhat obscure; there was some question of the violation of some unimportant treaty, the very existence of which was unknown except to diplomats; and over this treaty, which involved the right to self-government of a few dozen half-civilized islanders somewhere in the South Seas, an imperious message had been sent to the Mikado, worded so arrogantly that no ruler who retained his self-respect could disregard it. As a result, both countries were suddenly in a ferment, and rumors of war filled the air. . . .

The Volcano's Revenge

GENERAL BLACKFOOT and the President, seated with two companions on a cruiser which steamed slowly from the harbor of Misty Isle, were well aware of the demonstrations that agitated two lands. They knew what a tumult had been caused by the ostentatious drilling of troops, and the waving of flags, and the blaring of bugles, and the booming of drums; they knew of the inflammatory speeches, the military parades, the fierce mass gatherings that were fanning the battle flames. They looked upon their handiwork, and were satisfied.

Yet they were not so satisfied but that they preceived the need for quick action. "The preliminaries are now over," summarized the President, as, surrounded by his colleagues, he gazed toward the fog-veiled shore of the island. "We have allowed time enough now for every one to go war-crazy. Therefore it cannot be said that we struck without warning. No one, of course, suspects what lies ahead. We must give the enemy no chance to prepare. Now is the time! What do you all say?"

The others nodded in keen-eyed approval, and the President resumed, "Then I shall send a wireless command immediately to the Vice-President. He will act in my absence, and issue the official declaration. And then for the actual test! Tomorrow at this time there will be not a man or woman or child alive in all the cities of Japan!"

And, with an attempted witticism that somehow drew no response, the President arose, and went off in search of the wireless operator.

While he was gone, Dr. Turnbull addressed his companions gravely. "By the way, that geyser of steam at the northern end of the island seems to be giving trouble again. I saw it this morning, and did not like its looks. It was squirting like a whole fire department, and was twice as high as yesterday."

General Blackfoot shrugged. "But, of course, it will subside in time," he suggested, with a confident smile.

"Of course!" put in the Secretary.

Dr. Turnbull merely gave a wry grimace, and did not reply. And thenceforth, until the return of the President, the conversation lagged. . . .

"Done! It is done!" that official announced, reappearing and laughing, with a laugh that was like a cackle. "All that remains is to touch off the final fuse!" And his three fellow conspirators joined him in low, clandestine chuckles.

For a moment they glanced in silence toward the gray seas and the gray misty heavens, and toward the island's hidden shore, from which, before another day had passed, a host of winged marauders were to fly like a breath of destruction toward unsuspecting cities. . . .

But destruction of a different nature lay in store.

It was only half an hour later when the four men, closeted in secret conference, were aroused by the sudden shaking and trembling of the ves-

sel. Although the sea a moment before had been as calm as glass, the ship was buffeted as if by storm waves, and rolled and shuddered as though battling with a tempest. After a moment, the disturbance had subsided, and the vessel proceeded on an even keel; but Dr. Turnbull and his companions, rushing excitedly to the deck, were to learn that their alarm had not been unjustified.

For, although the ocean, except for the waning whitecaps, showed no sign of anything amiss, there was manifestly something wrong on Misty Isle. What was that flare of red flame which, surmounting the intervening hazes like a recurrent signal fire, appeared intermittently from the direction of the island? What was that rose-hued glow in the heavens? What that dull rumbling in the air, as though from a series of remote explosions? And what those yellow flashes which every now and then streaked through the skies, like far-off lightnings—except that they had an intensity and a lingering brilliance that lightning rarely possesses? And why that air of dull, indefinable oppression which overhung all things, of something terrible impending, as of some tumult about to descend, a silence and a heaviness that hovered threateningly over the world, weighing like unseen lead upon the nerves, as though the atmosphere were thick with gloomy omens and gathering spirits of evil?

From among the watching men, few words came to break the long, slow interval of waiting. All the joy of a few moments before had been drained from their expression; and the quivering of their lips and hands betrayed an agitation that they dared not put into words. Had a bomb of hyperblast exploded? Or had the volcanic forces beneath the island again burst into action? Had Turnbull's experiment dangerously weakened the crust of the earth? Such were the thoughts which, one may conjecture, flashed into the minds of the officials; for only two explanations of the disturbance were possible, and neither was to be welcomed.

But while Turnbull and his associates stood at the rail in silent reflection or meditatively retired to their cabins, the vessel drove on and on at a steady pace through the bleak seas. During the first hour, it maintained a twenty-two knot speed; yet its progress, though rapid, was not rapid enough. Once more some power from the unknown reached out after ship; once more a wave of terrific intensity overtook it, sweeping across the decks and making the craft stagger like a rowboat among rapids. Simultaneously, above the fog-bound shore of the island, a geyser of carmine light shot heavenward, bursting outward amid torrents of sun-bright sparks and scintillations. Then fountain after fountain of bloody flame was hurled aloft as from the discharge of cyclopean cannon; hissing red firebrands scattered with phosphorescent trails like great meteors; low rumblings filled the air, and growled from the fire-tinged clouds; and all the skies were a blazing fury, in which torn flags and tatters of orange light and glaring electrical streamers danced and glittered. And the billows, shaken and tortured, leapt up in tempestuous masses, in which the ship began to heave and rock like a toy; while four terror-sticken passengers, watching amid the jolting confusion of the cabins, clung helplessly to the flying furniture and offered up wordless prayers.

Perhaps it was well that they did not see the greatest wave of all, which, swollen to the height of a tall hill, came sweeping from above the horizon. Perhaps it was well that they did not know what frantic efforts the captain was making to turn and meet that wave prow forward. All that they realized was that suddenly there came a jolt as of whole mountains piling upon them; that all things outside their cabin were lost amid a dull thundering fury; that there was a ringing in their ears and an overtowering dread in their hearts; that it seemed to them as if the ship were turning bodily, was falling upon its side; and that, while it rose and shuddered and then fell with a world-drowning roar and crashing the blind waters came rushing in upon them, lashing out at them, choking them, quenching all things amid a chaos of mad, hopeless struggling. . . .

During the following days, the newspapers bore interesting reports. It was stated that there had been a volcanic eruption of unusual intensity, which a passing vessel ascribed to some previously uncharted island in the northern Pacific. At the same time, it was announced that the tidal wave resulting from that eruption had overwhelmed many ships, including the man-of-war on which the President, along with Dr. Turnbull and General Blackfoot, had been taking a vacation cruise. But, mitigating the evil tidings, there came a more cheerful bit of news: Japan and her neighbor across the Pacific, shocked profoundly by the disaster, had seen the way of sanity, and had submitted their differences to successful arbitration.

Today, if one were to voyage to Misty Isle, one would see half a dozen black reefs, the longest not a hundred yards in length, which project above the immensity of the waters. Seabirds have occasionally been known to roost there; seals from time to time choose the rocks for a sunning-place; mussels and barnacles and tangled seaweed are thick on their lower reaches, and sometimes the great snout of a whale or the long slimy arms of an octopus may be observed projecting above the surf. But the fogs that gave the island its name have disappeared, and man and the works of man are found no longer mid that stormy desolation.

THE END

The Reign of the Ray

(*Continued from page 33*)

There the Allied advance slowed up and came to a standstill. The Soviets by surprise gas attacks, by desperate forlorn hopes and by the thousand and one accidents of warfare, had managed to possess themselves of enough Adams Ray tubes to have an appreciable effect. They were also building some of their own according to Adams' earlier formulas. Though they were, to the end, unable to unravel the formula for the improved tube, they did succeed in producing an impermanent type that with the captures they made, was quite capable of silencing the guns of the Allied powers and bringing their aeroplanes to earth.*

Conceive the situation. Here were some hundreds of thousands of men who had come from their homes to kill eath other, standing in muddy trenches and staring at the enemy without any means of inflicting harm. The weapons had been struck from every hand; and the perplexity of rank and file was mirrored in the perplexity of the higher commands who thus saw their plans brought to nought.

For a few months indeed, there was almost universal torpor; a period of useless discussions at headquarters, of plans tried only to demonstrate their utter futility. To this time belongs the invention by the Soviets of the long-range solid shot gun, of the spur gun and similar devices. On the Allied side a hand grenade on the spur-piercing-a-lead-shell principle was tried (it failed when it was found that if the spot where the grenade fell was not at the moment bathed in rays, the grenade might not go off till the ground on which it lay was occupied by friendly troops); also various types of grenades contained in heavily-leaded glass which were to explode by chemical action—unreliable and ineffective weapons.

The realization that war had been pushed back to the middle ages came slowly; almost as slowly came the realization that further fighting would be necessary. There was a growing tendency in both groups of armies to regard the whole business as futile. Men began to straggle away to their homes, and had it not been for the ancient hatred between Teuton and Slav, it is likely that neither German discipline nor Communist fanaticism could have kept the flame alive.

This period was marked by sporadic and desperate hand-to-hand fighting around the points where some new weapon or invention was being tried; small battles that always ended in conflicts with bayonets fixed to the now useless rifles or held in the hand like a sword. As the autumn of 1932 progressed into winter, both sides began to drill and use cavalry in increasing proportions, for with the decline of missile weapons and gasoline traction came the knowledge that the horse was to be restored to his old place on the battlefield.

When the next year opened—the third of the war—we begin to see cavalry evolutions on a large scale and with them curious minglings of the old and new. Fortunately we have from this period the testimony of a direct observer in the invaluable memoirs of Sir Evelyn Oldmixon who went to Poland as a member of the British tank corps.

(*To Be Concluded*)

*It will be remembered that they had possession of Adams' Diary, describing his earlier results with defective tubes whose cathodes stood up only for a few seconds. However expensive and inefficient these were, they were better than nothing and the Soviets labored unceasingly to improve them.

IF you are a lover of science fiction and if you like SCIENCE WONDER STORIES, be sure to see the important announcement on page 88 of this magazine.

HUGO GERNSBACK,
Editor.

Warriors of Space

(*Continued from page* 51)

night world, presenting always the same face, but now it was changing. Slowly, it rotated on its unseen axis. New lines and shadows came into view. The old familiar contours were slipping from sight.

"They have done it! They have thrown Saturn into the sun! The earth is sinking; the moon is turning; the whole universe is changing!" Suddenly calm the professor crossed to where Louise stood clutching the window frame.

"Do not be afraid," he murmured, "it is only to be expected, but I wonder—where will we stop?"

For days the sensation of a strange disturbance in the world continued, while the fury of the wind and the waves hardly abated. News came to them of the inundation of villages along the shore near them and along the coast line in every country. Mountainous waves were seen at sea and the greatest ships were swept about like so many bits of wood. Nothing could live in those seas. The reports also came of the sweeping of the sea over entire lands and the removal of the sea from others. The entire geography of those areas has changed. Old lands disappeared and new ones came into being.

Then one day as they were standing fearfully at the telescope watching, fascinated, the brilliant electrical display of the sky, the strange motion of the earth to which they had almost become accustomed, ceased. The moon, too, became still, a new face shining down on the awe-struck world. A strange calm stole over the world.

Very gently the scientist, his face worn by sleepless nights, put his arm about the girl.

"It is done! Now we have but to wait." Long days passed. Then one day. . . .

Out from the upper air, down toward the earth coasted a gleaming golden car. Lightly it checked itself and floated to rest before the Maynard homestead on Long Island. A door in its side opened, and a young man vaulted out to run joyously toward the house. Halfway there he was met by an elderly man and a girl who rushed to meet him.

"My boy, my boy!" the elder Maynard threw his arms over his son's shoulders and madly pumped his hand. "I thank God that you are safe and that you have succeeded. Oh, we know about it! You have yet to learn of the jolt you gave this old earth. But those things can wait." There was a suspicious moisture in the scientist's eyes as he turned Donald toward the girl.

"Louise!"

Only the one word, but it spoke the whole thought of Donald's heart.

"Donald, my Donald, come back to me." The girl's eyes were bright with the light of growing happiness. She raised a hand to touch him lightly, as if she were afraid to find him only a shadow. "My wonder-man," she breathed, "moulder of a new universe!"

His arms went around her, holding her close. For a minute he stood smiling down at her, then his lips brushed close to her ear.

"You are the wonderful one," he whispered. "My universe is built around your heart."

THE END

What Is Your Knowledge of Science?

Test Yourself by This Questionnaire

The questions given below are taken from the stories in this issue. They will serve, by your ability to answer them without referring to the text, to give you a test of your knowledge of science. By thus testing yourself you will be able to fix in your mind a number of important facts of science that are presented in these stories.

The pages on which the answers are given follow each question.

1—What would be the effect of displacing a planet from its orbit? (Page 49).

2—What determines the speed of a moving body in the earth's atmosphere? In empty stellar space? (Page 50).

3—What did Bertrand Russell believe would be the effect of the release of atomic energy? (Page 9).

4—Why can a substance like uranium be used in a Coolidge tube? Why not iron or steel? (Page 13).

5—What is a robot? How can he be directed? (Page 68).

6—What is it that determines the chemical make-up of a substance? How could the substance be changed? (Page 58).

7—Of what is an atom made? (Page 58).

8—What is a diamond chemically? How could it be made artificially? (Page 38).

9—How are volcanic islets formed? How could one be made artificially? (Page 78).

10—What was the Napoleonic science of warfare? (Page 32).

The Marble Virgin

(*Continued from page* 61)

I think I must have been paralyzed for an instant. Or it was that I was numbed, while my brain reminded me that a phone call before had given Huxhold an opportunity to lay hands on Naomi!

I took the steps up four at a time, leaving the telephone receiver dangling, knowing in an inspired flash what the call was for! Yet it seemed an age before I had snatched open my door.

"Naomi!" I called. "Naomi! N-A-O-M-I!"

But no dear, sweet voice answered me; my living rooms and workrooms were strangely still and quiet—*empty!*

Naomi was gone!

Yet, "Naomi!"—I shouted in a mad frenzy again; before hurling myself out, across the hall, and at the door of Professor Carl Huxhold's laboratory!

It was locked, and I battered at it, tore at it with the strength of desperation! Unaware of the hurt that my shoulder received, I stepped back a few paces, then lunged forward with all my might! And Huxhold's door burst open!

I saw him standing beside the fearful electron-dissolver, heard him turn with an animal snarl as I plunged into the room; and I saw Naomi, whom I knew I loved with all my powers to love, *standing against the glassy-surfaced curve inside Huxhold's terrible cabinet!*

I screamed a man-scream of fear and agony! But while I raced forward with the speed of lightning, Huxhold's fingers were quicker!

Naomi had evidently been doped with the same hypodermic that Huxhold had used to quiet the dog, on that occasion when first he tested his scientific prowess. But the injection had not been sufficient to thoroughly subdue her; she was standing erect, dazed but recovering her wits; and had she had another instant she must have escaped to my arms!

Hellishly despicable was the speed with which Huxhold flicked the switches shut and whirled the dials of the electron-dissolver!

From the rectangular-shaped horn of that awful box there shot that appalling beam of effulgent, voltaic potentiality! It swept about Naomi, was reflected back from the gleaming curve of the terrible cabinet in dizzying flashes of violet, of red and green!

Naomi half raised beautiful arms to me; her lips voiced one low tragic cry—"Wal-ly!" Then the beam, like a wave of live malignancy, became a blood-hued shaft! Barely uttered, trembling in the very air, Naomi's voice ceased! She . . . was . . . gone!

I saw that Huxhold's cabinet stood empty; only the luminosity from the electron-dissolver striking and being beaten back and repulsed by the scientific capability of that curve of shimmer-surfaced lead! *Utterly, irrevocably, Naomi had been torn from me!*

The rest has been written at the beginning of this chronicle. How I stabbed Huxhold, and he died. I am glad that I killed him. I know that he had planned, after shooting my beloved Naomi to the plane of split-electrons, to send himself by the same means after and join her there! Because Huxhold believed that a being, dissolved by his ray, has some sort of a life there, and a form, although he did not know what it was!

I dragged the electron-dissolver and cabinet to my workroom, by the act making deep scratches and gouges in the floor which I know that the police who come to investigate will follow, and it is set up here and ready. I have connected the wires to a switch, and the dials on the box are properly set. It only remains to place myself inside the cabinet and pull the farther electric switch shut by an attached cord, which is likewise ready for me! Then, in the twinkling of an eye, I shall dart into the eternity of space, myself a swirling mass of split-electrons, to find Naomi—the girl of my dreams, whose form I made by my skill in sculpture!

To find Naomi! Glad is the promise carried in those three words!

My time is up. There are steps on the stairs. It is Huxhold's visitor, come to keep his appointment! Huxhold's door is unlocked; in an instant the man will open it.

There!

The man is shouting something. Displeased, no doubt, at finding Huxhold dead, when he should be glad!

What shall I write to bring this to a close? A "Good-bye?" No, I think no. It will be beautiful to go out with her name on my lips!

Now I will step inside Huxhold's terrible cabinet and grasp the switch-cord!

"Naomi!" . . .

THE END.

The Diamond Maker

(*Continued from page* 37)

carelessly thrown aside—one, I repeat, was almost as big as my thumb. Or he may be still wandering about trying to sell the things. It is just possible he may yet emerge upon society, and, passing athwart my heavens in the serene altitude sacred to the wealthy and the well-advertised, reproach me silently for my want of enterprise. I sometimes think I might at least have risked five pounds.

The End.

Science News of the Month

ASTRONOMY

SERIOUS ASTRONOMICAL ERRORS

Our hopes of measuring the universe, as one measures a room, seem to be dissipated by the statement of Abbé Moreaux, director of the Observatory of Bourges in *"Le Petit Journal of Paris."* According to this eminent astronomer the figures of hundreds of thousands or millions of light years which are supposed to be the dimensions of the various nebula are founded on colossal errors. Errors as great as thirty per cent have been announced, and the Abbé pessimistically feels we must look to the next century for more definite knowledge about the "great open spaces." The application of photometric methods of measurement of our solar systems, has undoubtedly, Abbé Moreaux says, led to the extension of our ideas of the vast oceans of space about us. For example, the diameter of the Milky Way which, calculated by the old methods, was put at 15,000 light years in 1915, has by the experiments of the American astronomer Shapely been placed at 300,000 light years.

NATURE OF ASTEROIDS DISCOVERED

The nature of asteroids, those pigmy planets, has long been a matter of debate among astronomers. That they were merely burned out comets which have lost their "tails," or gaseous envelopes, was suggested by Professor Leuschner of the University of California. Now after spectroscopic studies upon these stars and of comets, N. T. Bobrovnikoff, an associate of Prof. Leuschner, has found definite evidence of the professor's theory.

(This theory appears somewhat unplausible, as the asteroids—minor planets—are only found between the orbits of Mars and Jupiter. It is still widely held that the asteroids are the shattered remains of a former planet.—Editor)

COMPOSITION OF MOON

The moon is not made of green cheese, but of a porous material similar to volcanic ash, says Dr. Paul S. Epstein of the California Institute of Technology.

BEHIND THE TIMES

"Give me $2,000,000 and I will show you the scenes of the past," says in effect Dr. M. Luckiesh, director of the National Lamp Works at Nela Park, Cleveland. A belief that electrically magnified telescopes trained on distant stars will catch reflections from the earth of what happened here many, many years ago, animates Dr. Luckiesh. "For instance," he goes on, "If I could train a supersensitive reflector on a star seventy-seven light years away I would be able to watch what was going on in the world 154 years ago. I'd see George Washington galloping around a battlefield somewhere." Dr. Luckiesh firmly believes that his plan is possible. He merely has doubts about the worthiness of the expenditure.

(This is the old theme used by many science fiction authors. It is to be doubted that Dr. Luckiesh made the statement seriously.—*Editor.*)

AVIATION

NEW COOLING FLUID FOR AIRPLANES

A new cooling fluid for water-cooled airplane engines has been developed by the Army Air Corps which they declare will revolutionize the operation of all aircraft which uses it. Composed of a number of chemicals whose nature the War Department has not divulged, the fluid is said to be vastly more efficient than water. Only 4½ gallons of it are required to do the work of 18 gallons of water. This means a saving in weight of 84 pounds. The reduction in the amount of fluid allows a corresponding reduction in the size of radiator required, which means a further saving of 40 pounds. Furthermore the reduction in the size of the radiator means a reduction in its resistance, and as the resistance of the radiator is often 20% of the total resistance of the craft, the saving is apparent. Having a much higher boiling point than water the fluid will also permit operation of the craft over a much greater speed for a longer time. With a saving in weight of 100 pounds and a greater range in operation of planes the fluid is expected to do wonders to advance the cause of aviation. Some inkling of the nature of the fluid is expected to be divulged by the War Department shortly.

CEILING INDICATOR MEASURES

An indicator to mechanically measure the height of clouds (or ceiling) above an airport has been perfected by the Graybar Electric Company says *Air Transportation.* The indicator consists of a triangular shaped instrument mounted on a short galvanized pole having incorporated a scale graduated in feet and a revolving pointer. To get the height of the clouds, the ceiling projector is inclined thereby throwing a spotlight on the clouds. The operator sights along the pointer of the indicator at the spot light and the height of the cloud is read on the indicator scale.

GROUND FLAME TRAINER

A device developed at the Wright Field Experimental Flying Station will give an embryo aviator all the sensations of being in the air without moving off the ground, says *Science.* The "orientor," as it is called, is able to simulate the control apparatus of the cockpit of a plane; it has a propeller and engine to give the plane's basic movements. The daring aviator seated in the cockpit will hear the roar of the engines, the rush of air, and he will get the effects of loops and turns. The apparatus is electrically controlled.

NEW AVIATION LIGHT-BEAM

The use of a rotating beam of light, half red and half white, to guide aviators to the landing field is now in use in the Cleveland Municipal Airport says *Science.* By this rotation, the beam will be seen by the aviator no matter from what angle he approaches the field. The use of the multi-colored beam will enable him to distinguish it.

CHEMISTRY

WORK OF ARMY CHEMISTS IN PEACE

The work of the Chemical Warfare Service of the Army continues even during times of peace. Although deprived of the urgency of war-times, they are still making many discoveries which will be utilized in war. Many improvements have been made in gas masks to increase the comfort of the wearer by decreasing the resistance to breathing. The absorbents which neutralize the gas have been improved, thus increasing the protection of the wearer. And in the newer models of masks both vision and the ability to speak through them have been improved. Much work is also being done by the Chemical Warfare Service on the production of smoke clouds. Planes flying at 150 to 250 miles per hour have produced clouds 8,000 feet long. The use of the Stokes mortar to lay a barrage of smoke has also been subjected to successful tests. The realization that the next war will be one between chemists appears to be pretty universal.

AN UNUSUAL DRUG

To give jaded Paris a new thrill, a drug called peyote, made from Mexican cactus, has been introduced and is having quite a sale in that gay metropolis. Said to be non-habit forming, having no after effects and creating a kind of visual intoxication in which the subject sees "visions," the drug has created quite a stir. The medical profession of France is up in arms, though, and the Tribunal of the Seine has been requested to place a ban on the sale. It is, of course, already prohibited in the United States and in Germany.

SCIENTIFIC STUDY OF INSECTS

A determined study of the insects that prey on crops, is forecast by the establishment at Iowa State College, of a complete greenhouse, screened out-of-door laboratory and underground laboratory. Studies will be made of various means of combatting these pests, beginning with the accumulation of data on their life history and method of operation.

CLOTHING OF ASBESTOS PREDICTED

That women of the future will wear clothing made of asbestos was predicted by Professor Paul G. Caré, of the Philadelphia College of Pharmacy and Science. These gowns, the professor says, will be as lustrous as silk, more durable than homespun and cheaper than any other material. The clothes will not only wear well but will also clean easily and due to the resistance to heat of asbestos the clothes will give physical comfort. The necessity of going to the mineral kingdom for our clothing will be a result of the inability of the animal and vegetable worlds to supply our needs. That the use of asbestos for cloth is not entirely new, is proved by the history of the Romans. They, however, used the products chiefly as shrouds to keep the ashes of the cremated from being lost in the funeral pyre. The use of fabrics made of rayon, which is really a synthetic compound, is an illustration of Dr. Caré's thesis.

GEOLOGY

AGE OF EARTH IS 3,400,000,000 YEARS

Dispute about the age of the earth has persisted for many years. The methods of computing it have been almost as numerous as the disputants. Now according to *Science News Letter* comes the conclusion of Sir Ernest Rutherford, Nobel Prize winner, that a study made by Dr. Aston of the Cavendish Laboratory of Cambridge is correct and reveals the maximum and probable age of the earth as nearly three and a half billion years. The method used by Dr. Aston was the study by an instrument called the mass spectrograph of the disintegration of certain heavy metals such as lead. He found a metal called actinium, which is radioactive and disintegrated into lead. Actinium on the other hand is descended from uranium which had its origin in the sun. He calculates therefore that it would have taken 3,400,000,000 years to bring the uranium down to the forms in which it is found on earth. "We may thus conclude, I think with some confidence," states Sir Ernest, "that the process of production of elements like uranium was certainly taking place in the sun four billion years ago and probably still continues today." The age of the sun was also calculated and said to be seven million million years.

OIL LOCATED BY NEW DEVICE

If a prospector were to say, "There's oil in them there hills" without actually seeing it he might be said to have been using a new device developed by A. J. Carlson of the University of California. The equipment for oil locating consists of a rod which automatically measures depth. Around the rod is a mile or so of piano wire, with three heavy brass thermometers fastened to the end. The thermometers are lowered into the well and at various intervals additional sets are fastened to the wire. The change in temperature at the various steps recorded are the guides to the possible presence of oil. The theory is that the temperatures in wells over oil increase more rapidly than over barren ground.

TOWARD MT. EVEREST AGAIN

A new attempt to climb Mount Everest in the Himalayas, the highest peak in the world, will be made this summer according to *Science*. Attempting to penetrate the secrets of this peak, which has cost so many lives will be a party of Dutch alpinists and scientific men aided by Swiss and Indian guides.

MEDICINE

WEIGHT OF BRAIN DETERMINES INTELLIGENCE

Studies in the relation that exists between the size of the brain and the intelligence of the owner of the brain are being made by the Wistar Institute of Anatomy and Biology. Recently the examination of the brains of three eminent men, who donated their bodies to science after death, have shown interesting results. While the average weight of the brain of a white man is 1,375 grams the brain weights of the three men were respectively 1,412 grams, 1,396 and 1,309. These weights are considered quite large as the men were all of an advanced age, and for part the age of their maximum brain weight. That the weight of the brain increases as one ascends the evolutionary scale was also announced. Going from fish to reptiles to apes and man reveals an increasing brain weight. The great apes for examples show a maximum weight of 600 grams, while the minimum for human beings is 900 grams. White women have smaller brains than men, the weight being 1,244 grams as compared with 1,375 of the men. The examination of the brains of 100 superior men have revealed a weight of about 100 grams greater than that for the average of the race.

NEW TUBERCULOSIS VACCINE IMPORTED

A vaccine made of "killed" germs, which it is claimed will increase greatly the resistance to the contraction of tuberculosis was imported from France by former Senator Nathan Straus, Jr., of New York. The vaccine which is the work of Dr. Albert Vaudremer formerly of the Pasteur Institute of Paris, is not a cure for the white plague, but rather a preventative. It has been used in France for several years and was approved by the French Academy of Medicine last year. Senator Straus states that a year or so will be spent in thorough-going tests in America before the French claims can be verified and before the vaccine is released for use by the medical profession.

NEW DRUG WILL CURE RICKETS

Rickets, that scourge of infants, is about to pass into the realm of diseases conquered by man through a new drug called *ergosterol*. It has been well known that rickets came as a result of the lack of vitamin D in the food. The usual method of prevention was the feeding of cod liver oil. Now, ergosterol which is made from a fungus called ergot has been found to contain the curative properties of cod-liver oil intensified a thousand times. It is almost, says Dr. Hess of Bellevue Hospital, New York, as if the vitamine were isolated in the drug. Or it is equivalent to taking ultra-violet rays internally, as it is the ultra-violet ray which is the potent agent. "Irradiated ergosterol," says Dr. Hess, "is able to cure rickets in animals and infants when given in infinitesimal amounts. Its dosage has not yet been fully established, however, and until it is we must wait for its therapeutic application."

CURING A TERRIBLE DISEASE

Curing softening of the brain by the inoculation of the patient with malaria is a discovery of Dr. Wagner-Juaregg of Vienna, which won him the Nobel Prize in Medicine. This disease, which is said to have been always fatal within three years, is being treated at the Manhattan State Hospital on Ward's Island, New York, where Dr. George Kirby claims to have made a complete cure in one-third of the cases he treated. The idea used in the cure is to induce a high temperature in the patient by the malarial infection. This heat of the body kills the paresis (softening of the brain) germs faster, says one authority, than flies are killed by arsenic. The malaria is then cured by the use of quinine.

"Science News of the Month" portrays in plain yet concise language every important scientific advance during the month. Nowhere can the average reader get such a wealth of accurate and vital information condensed into such a small volume. Some 42 scientific journals as well as a score of other sources are utilized by our editors in the compilation of this department. The publishers welcome short contributions to these pages from the various scientific institutions, laboratories, etc.

DANGER IN USE OF X-RAY

The great popularity of the X-ray as a treatment for cancer has resulted in a great many physicians using the ray who have not sufficient skill, says the League of Nations Cancer Committee. And inasmuch as the treatment itself is in the pioneer stage only, there exists a great danger in the misuse of the ray, with a consequent severe damage to the patient's health. Great skill is required to effectively apply the ray, says the committee, and it will take a reasonable length of time before a sufficient number of physicians can be trained to adequately handle the dangerous rays.

LAWS OF HEREDITY THROUGH MICE

The selective breeding of mice in order to determine how their characteristics are formed is the work of Professor Leslie Dunn of Columbia University laboratories. By his experiments with that despised foe of man (and woman), Professor Dunn hopes to find the laws of heredity which he believes may be applied to man. Perhaps the superman of the future will come from the Professor's studies of the lowly rodent. Already house mice of any desired color of coat or tone of eye are being produced. "Most of the varieties of mice known," says Professor Dunn, "of which about 2,000 exist, or can be produced, are descended from wild house mice. Once you know the inheritance of any individual case, by proper combination you can put any coat you like on the offspring."

FLIES USED FOR X-RAY EXPERIMENTS

Flies are about to be put to useful service for mankind in the experiments of Dr. Mary D. Stark of New York City. Dr. Stark wishes to trace the effect of the x-ray on the reproductive organs, and for this purpose, the fly, reproducing quickly and often serves as an admirable subject. Her experiments so far indicate that the harmful effect of the rays show itself in the third or fourth generation. While the individual exposed continues to grow the offspring die off. Her theory is that the injury is transmitted to the descendants and destroy them. Dr. Stark hopes, by her researches to obtain data that may be applied to man. If she continues, she will at least have found a method to permanently rid the world of flies.

CURING TUBERCULOSIS IN THE TROPICS

Physicians still hopeful of finding the real climate in which to cure tuberculosis, now turn to the tropics. Researches are being planned, and medical arrangements made with physicians in charge of hospitals in various parts of the tropics to study the effect of the tropical air on such cases as come before them. These researches are being sponsored by the American Sanitarium tuberculosis committee in conjunction with many other associations interested in the curing of victims of the white plague.

NO CURE FOR DRUG-ADDICTS

After a trial of nearly a year, the report of the Mayor's Committee of New York on drug addiction has "found wanting" the use of marmoon as a cure for addicts. The treatment was given to 60 patients, says the committee in a report to the *Journal of the American Medical Association*. These addicts, when deprived of their dope and given marmoon, exhibited the same symptoms as those who had not been so treated.

POISON GAS AND TUBERCULOSIS

That men gassed during the late war are more immune to the contraction of tuberculosis than those untouched is the statement made by Col. H. L. Gilchrist, chief of the Medical Division of the Chemical Warfare Service. As verification of this very interesting statement he mentions that in 1918 the tuberculosis rate for all the enlisted men in France was 43 per cent higher than for those who had been gassed. In 1919 it was 75 per cent higher. *Chemical and Metallurgical Engineering Magazine*, commenting on this, ventures the suggestion that colds and influenza might be avoided by the use of gasses such as chlorine. This journal goes on to state that, in its experience, workers in plants where the air is polluted with sulphur dioxide show immunity to ordinary respiratory affections. "Perhaps it is an example of the survival of the fittest" the article goes on, "where those who have remained have developed a tolerance for both gas and infection."

PHYSICS

MAN-MADE LIGHTNING

The production of lightning bolts of 5 million volts has been achieved by the General Electric Company, says *Science*. This goal has been reached although the maximum capacity obtainable a year or so ago was only a half million volts. The aim of the company is to study the effect of lightning discharges on transmission lines by making their own lightning at will. This work is expected to result in information sufficient to bring closer the day when lightning will no longer cripple electric generating and transmitting equipment.

LIGHT FROM FIREFLIES

The possibility of making synthetically the type of light which emanates from the firefly will be solved in the future, declares Dr. E. Newton Harvey, professor of physiology at Princeton University. The light from the firefly, states the professor, is produced by an oil called *luciferin*, which the firefly contains, being subjected to oxygen and water. A firefly in an atmosphere devoid of either of these materials will emit no light. Although luciferin is a complex organic compound, Dr. Harvey believes that it can be made synthetically, and used as the firefly uses it, over and over. A second compound found in the firefly, which acts as a catalyst to hasten the transformation of the luciferin into light can also be made, Dr. Harvey concluded.

MEASURING BLACKNESS

An instrument for measuring the blackness of objects, and called the Nigrometer, has recently been devised, says *Instruments*. The device is in principle a photometer which provides a great intensity of light on the specimen. By a movable light source within a horizontal tube and attached to a movable scale, a photometric balance is obtained, as in an ordinary photometer. The point of balance as indicated on the scale is taken as the measure of the blackness of the specimen. A standard of blackness is furnished in the form of a small black tile mounted in a box.

DEVICE TO MEASURE DURABILITY OF STEEL

A device to measure the depth to which a piece of steel has been case-hardened, without even scratching the steel, has been perfected in the laboratories of the University of Michigan. It has been successfully tested and has measured the depth in samples of roller bearings to one sixty-fourth of an inch. The importance of such a device is realized when the effect of case hardening on the durability of an engine part is considered. Many motor engines, it is stated, would have their lives measured in course instead of thousands of miles were it not for the hardening of the metal to resist wear. The inspection of parts easily and efficiently in the factory will now be possible. This, applied particularly to airplane motors, will serve to greatly increase their dependability and efficiency.

RADIUM PREVENTS FIRES

A new use for radium, in the preventing of fires due to explosive gases in the air of rubber factories, has been successfully tried out in Russia, says *Science*. The friction of rubber-covered fabrics on the drying machinery often accumulates great charges of static electricity. Then a breakdown of the charge into the air by a spark will ignite the explosive gases that are always prevalent. A milligram of radium placed near the point where the electricity is generated will ionize the air and making a good conductor of it, will lead the charges away to a ground so that they do not accumulate. Since the particle of radium will last several hundred years, the cost per year is quite small.

TRAIN CONTROLLED BY THE VOICE

"Stop" or "Go Ahead" is all that is necessary to say to a toy train, developed by the General Electric Company to make it halt or proceed on its way says *Science*. A telephone transmitter on the train leads to a vacuum tube which connects to a selector which governs the motion. The sound waves changed to electric vibrations determine the polarity of the tracks, so that it is possible by changing the polarity to either halt a moving train or make it go backwards. In the latter case it is only necessary to say "Back Up." Suburbanites who watch angrily as trolley after trolley passes by their stop without halting, will pray fervently for commercial application of this device.

WEATHER FORECASTS BY RADIO OPERATION

Morgantown, West Virginia, can pretty nearly tell what weather it is going to have the next day by the operation of its radios tuned in on Station KDKA located at Pittsburg. When the intensity of the signals, just after sunset, becomes weaker, then Morgantown can look forward to clear weather, but if they become stronger then there will be cloudiness or rain. Of forty tests made to test the faithfulness of this new weather man, says *Science News Letter*, thirty-eight were found to be correct. The interpretation placed on this phenomena is that the changing pressure in the air causes an electrical disturbance in the radio, and since Morgantown and Pittsburgh get changes in pressure at the same time, the effect on the radio is the same.

ELECTRIC EYE PUTS ON LIGHTS

An electric eye that puts on the lights in a room, when the room becomes too dark, was tried out successfully in a Schenectady school by the General Electric Company. The device consists of a small box about the size of a radio receiving set. At one end is a small lens which allows the light from the room to fall upon a photoelectric tube. Whenever the light in the room falls below a certain intensity the electric eye causes a relay to operate and the lights are put on. By arrangement with a time clock, the lights are extinguished at a certain predetermined hour.

IS ABSOLUTE ZERO ABSOLUTE?

Whether all life must cease at a temperature of absolute zero, —273 degrees centigrade, is doubted by Dr. C. W. Kanolt of the United States Bureau of Mines. From his experiments he disagrees with the prevailing theory as to what happens at that ultra frigid temperature. Dr. Kanolt has come within 22 degrees Fahrenheit of absolute zero and his observations lead him to believe that life could be maintained at that point. The fact is well known, for example, that fish may be frozen and kept alive in that state for some time. Whether or not they can be kept at absolute zero without dying is a question to be solved when absolute zero is reached. The lowest temperature thus far attained was within one degree Fahrenheit of it, made by Dutch scientists while solidifying helium.

PHOTOGRAPHS EXPLOSION WAVES

The photographing of the pressure waves in the air, generated by the explosion of dynamite, has been accomplished by the Bureau of Mines. The pressure impulses, which are normally invisible, are made visible by utilizing the changing refractive index of the air when it is compressed and a special wave-speed camera. The purpose was to determine what effect the explosion of one charge of dynamite has on another which is situated near the first. It was found that if the distance between the two charges was not too great and the second was sufficiently sensitive, the mere pressure waves emanating from the explosion would set off the second. In other cases however it is necessary for the expanding gases of the first explosion to reach the second before detonation occurred.

HEAT MAGNET HOLDS HEAVY WEIGHT

The dream of modern scientists, the production of electrical energy from the heat of the sun was brought a step nearer reality by the heat magnet invented by Dr. Paul E. Klopsteg. Using the old thermocouple device of having two dissimilar metals joined and heating one junction while the other remained cool, Dr. Klopsteg attached a disc to the device and made a magnet which under test lifted 480 pounds. That this is a remarkable achievement becomes evident when one considers that the use of thermocouples in the past has yielded only a very feeble current. Its use in the past has been chiefly to measure accurately high temperatures. The magnet is a disc of soft iron about 4 inches in diameter and an inch thick. A circular groove is cut in it and a heavy copper bar bent into it. The ends of the bar are joined by another bar of a copper nickel alloy, and one of the junctions formed is heated while the other is kept cool. A second disk to which is attached a hook is held against the magnet and then heat is applied to one junction, the magnet is energized to hold the weight mentioned. By some means Dr. Klopsteg has been able to reduce the resistance of his circuit to get an appreciable current from a small almost negligible voltage.

RADIO-TELEVISION

TRANSMITS PICTURES BY NEW PROCESS

A new process of transmitting letters at the rate of 650 words per minute has been perfected by Dr. Zworykin of the Westinghouse Research Laboratories. This device will also transmit and receive a 3 in. x 4 in. picture in black and white or half tone. In this method, a pencil of light is focused on a diaphragm. The image of the diaphragm is focussed on the surface of the picture. The reflected light is gathered by means of a curved reflector, the focus of which coincides with the illuminating spot. Part of the reflector is cut away in order to pass the light and the remaining is brought down to the surface of the picture. Thus all the reflected light is collected and projected as a parallel beam. A flat mirror with a small hole for passage of the illuminating spot intercepts the reflected light and diverts it to the photoelectric cell. At the receiving end a standard bromide photographic paper is wrapped around a recording cylinder and a special helium glow lamp furnishes light for reproduction. The radio set is a standard receiver.

DAILY IMAGES BY TELEVISION NOW

The sending of daily images by television is announced by Station W2XBS, operated by the Radio Corporation of America, 411 Fifth Avenue, New York. The images are broadcast from 7 to 9 P M. Eastern Standard Time on the radio channel from 2,000 to 2,100 kilocycles, equivalent to 142.8 to 149.9 meters. The pictures which are signs and images of persons and objects are 60 scanning lines high and 72 elements wide. Twenty complete pictures are sent a second.

TELEVISION LICENSES RESTRICTED

The granting of licenses to operate television broadcasting stations are to be limited for the present to those stations engaged purely in experimental work, according to a Federal Radio Commission decision. Licenses will be granted only after examination by the commission of the proposed work to be done. And those who are fortunate enough to secure the licenses will have a six months' tenure during which they will be required to render monthly reports regarding what they have done to advance the art, the exact times they are on the air and what power they have used. The refusal of licenses, in cases where the sale of receiving sets is part of the program of the applicant, will be the rule.

GENERAL

"THINKIE" MOVIES NOW

A demonstration of what might be called "thinkie" movies was made recently at the American Theatre roof in New York City. Two women on the screen were the performers. The master of ceremonies attempted to direct their movements by requesting them to obey certain instructions. But something must have gone wrong, or the signals were crossed for the young women did not obey directions. An attempt to make a vaudeville act of the performance met with partial success. Members of the audience were requested to write questions on a slip of paper which, handed to the master of ceremonies, were to be answered by mental telepathy acting on the performers. Several questions were really answered. How or why, no one knows. A good trick in any event.

CONVERT SHIPS TO ELECTRIC POWER

The conversion of five ships of the Roosevelt Line from steam to Diesel electric propulsion is going on after the successful test made on one converted ship. Engaged in the trade with the Far East, it was found that greater speed was required for these long trips, and a greater efficiency in the cargo space available. The Defiance, one of the ships of the line, was changed over to 10,000 electric power driven by Diesel engines and the results were so satisfactory that four sister ships will be similarly converted at an expense of over $1,000,000 each.

HOW A GENIUS WORKS

The statement that genius is 90 per cent perspiration and only 10 per cent inspiration is disputed by those who know Elihu Thomson, one of the country's foremost scientists, according to an Associated Press despatch. Dr. Thomson does not sit and ponder over possible inventions but carries his thoughts with him through his day's work, talking his head with them, so to speak and working on them whenever a thought strikes him. Dr. Thomson is he who undertook one of the most difficult scientific tasks in the world, the construction of the 200 inch mirror for the telescope of the California Institute of Technology. This mirror, which will have twice the diameter of the largest in use at present, will be made of quartz. And despite its huge surface it will have to be accurate to one-millionth of an inch.

LEANING TOWER OF PISA SAVED

For years the Leaning Tower of Pisa, one of the wonders of the world, had been sinking into the soft earth on which it rested. The rate of this movement was estimated to be as much as a millimeter (0.04 inch) a year. Now this tower which is 750 years old will have a firm, secure base. Cement in liquid form will be shot through pipes under the tower until a platform strong enough to hold the tower is formed. But, it is understood that the Leaning Tower will not be straightened.

NEW METAL TO DISPLACE ALUMINUM

The perfection of a commercial process to extract beryllium from its ore presages the displacement by this metal of aluminum says *Popular Mechanics*. For, being one-third lighter than aluminum and having most of the valuable properties of both steel and aluminum, there seems to be no reason why the commercial production of the metal should not cause a widespread use in automobile, airplane and other engines where lightness and strength are necessary. Beryllium is not a new metal, having been discovered before 1800. But the extraction of the metal from its ore, beryllium oxide, has consistently defied an attempt to make the process commercially profitable. Recently, however, Hugh S. Cooper had accomplished this feat and patented a process for its development. The metal will probably be used as an alloy in combination with aluminum.

MAKING USE OF MOULD

Mouldy material or decay on vegetable matter, instead of being fit only for the garbage pail, is now used to produce a valuable chemical, according to *Science*. Experiments on the farm of the Department of Agriculture at Arlington, Va., has produced from decaying matter a chemical called gluconic acid. The method used is to feed the mould with glucose (worth five cents a pound wholesale, says the article), and the ensuing product is worth thirty-five cents a pound. What price garbage! In the experimenting, the mould, which is really the growth of little organisms on the matter, is put into a flask containing glucose and heated to a temperature of about 75 degrees. Gluconic acid results.

ELECTRICITY FOR NOTHING BY THIS DEVICE

Two convicts in the Maryland State prison are said to have invented a method of producing electricity at a cost bordering on zero. Water is forced into an air chamber by its own pressure, says the report, and compressed air forces the water into a turbine, which evidently produces the electric power. From the turbine the fluid is returned to its original container and used again. The inventors, who have recently received a patent, declare that they could supply the electricity for their prison, which costs $70,000 a year, for $1,000. As an interesting sidelight it is stated that the men built their device almost entirely from blue-prints, as they were unable to obtain a working model until they were nearly finished.

(We await with interest further news of this machine. Somehow it smacks of the old perpetual-motion device.—Editor).

FOG DISPELLER URGENTLY NEEDED

Many methods have been invented for producing smoke clouds and even fogs, but as yet no one has found a practical means of dispelling them. The many attempts that have been made have ended universally in failure. Several means of electrically precipitating the mists have been tried out but the fog still persisted. Other plans have tried the draining off the fogs over landing fields. But these too were impracticable. The problem is still to find a practical means of erasing the fogs on a large scale.

SEPARATED TWINS AFFORD RESEARCH DATA

An excellent opportunity for the study of the relative effects of heredity and environment, was afforded recently, says *Science*, by the discovery of twins who had been separated since infancy. Dr H. H. Newman of the University of Chicago in the *Journal of Heredity* reports his findings upon a study of the girls. They were both born in London, and at the age of eighteen months one was brought to Canada, the other remaining in London. Now after twenty years they are together again. Dr. Newman finds that physically the Canadian sister is much the stronger, although he blames the war-time suffering of the London sister for this disparity. Despite the fact that both sisters had equal educational facilities and a similar background of experience, in mental tests the Canadian sister consistently rated higher. However just one formulate a hasty conclusion from this test it must be remembered that a similar test conducted four years ago led to just the opposite results. Dr. Newman concluded that a great deal of experimenting must be done before some real knowledge of the effects of heredity and environment can be gained.

SKYSCRAPERS SWAY LIKE TREES

That the towers of skyscrapers are affected by wind pressure and heat and sway to and fro like young saplings has been proved by accurate tests. A movement from one to three inches from the vertical has been observed in large buildings such as the Woolworth Building in New York. There are two movements. The first is a bend caused either by wind pressure or by the heating of one side of the building. The latter causes an expansion of that side and consequent leaning toward the cooler side. The second movement is a continuous one, a vibration like that of a tuning fork. This is caused by a sudden gust of wind which sets the building swaying about its base. Neither of these motions are susceptible to the eye or to the occupants of the buildings, however.

SOURCE OF SOLAR RADIATION EXPLAINED

One of the questions of Solar physics that has bothered scientists has been the source of the energy of solar stars. From where has come the energy to keep for millions, or perhaps billions of years, these great suns of the universe burning at a temperature of from several thousands to several millions degrees? It was believed, at first, that the contraction of the stars released heat, and that this would account for the supply. But studies of the matter have revealed that long, long ago the stars would have contracted to practically nothing, had this been the sole source.

Dr. Walter Adams, director of the Mount Wilson Observatory, recently in the New York *Herald-Tribune*, advanced two possible theories to account for the seeming permanence of solar radiations,. The first was the theory of the transmuting of the solar elements into other elements. The electrons of various elements are redistributed, due to the intense heat. In this case if hydrogen electrons were to be recombined to form another element, say helium, .008 of each hydrogen atom would be lost in the process, the loss being transferred into heat. The amount of energy liberated by one pound of hydrogen would be 430,000,000,000 horse-power a second. The second theory is that matter is being annihilated completely, the pound of hydrogen vanishing into pure energy. In this event the energy liberated would be 125 times that given above. The sun however, would be losing mass at the rate of 120 million million tons a year and would vanish at the end of 15 million million years more. Between the two theories, with our present knowledge, says Dr. Adams, there's not much to choose.

ELECTRIC EAR FOR STUDYING SOUND

The human ear, long a valuable appendage, though hardly an object of beauty, may pass into the discard by the invention of an electric ear by the Burgess Laboratories of Madison, Wisconsin. The device, which was exhibited before the New York Electrical Society, can be used immediately, the inventors declare, to determine the acoustic properties of auditoriums before they are fully constructed. By measuring the periods of reverberation the "electric ear" determines how well, in a particular case, sound waves will be reflected to the listener. And as reverberation is said to be the greatest single factor operating against good acoustics, the problem is said to be mechanically solved.

PROVIDING RAIN FOR THE SAHARA

A plan to change the entire climate of part of the Sahara Desert has been recently announced. The method used is most ingenious and involves taking advantage of all the laws known about the relationship between rainfall and geography. It has been found that there are a great number of dried up lakes and rivers in the northern part of the desert, all of which are below sea level. The plan is to construct a canal to the Mediterranean and fill up the lakes. The evaporation from them will form clouds which floating over the desert will fall as rain and thus irrigate the desert and make it fertile.

AIR WONDER STORIES which will be out on all newsstands on June 1st, is a fitting sister magazine to SCIENCE WONDER STORIES. It is a revelation in science fiction stories of the air. Be sure to reserve a copy now or make yourself sure of it by a subscription.

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What Science Fiction Means To Me

WHEN the publication of SCIENCE WONDER STORIES was first contemplated, the editor of this publication addressed a number of letters to science fiction lovers. The editor promised to pay $50.00 for the best letter each month on the subject of "What Science Fiction Means To Me." This contest will run for three months, beginning with this, the initial number of SCIENCE WONDER STORIES. The last prize winning letters, therefore, will appear in the August number

The response to the request was so great, and such a large number of most excellent letters were received, that it is only possible to print a few of the best ones. We are sorry we are not able to publish more of them. The editor admits he was hard pressed to award the first prize, but we hope our readers will agree on the selection.

The remarkable letters printed here, show in what extreme esteem fiction is held by our readers and authors.

First Prize $50.00

The Door to the World of Explanation

Science fiction is my hobby, and yet it is more than that. It is my hobby because, during the past ten years, I have saved all magazines wherein I found science fiction stories. It is infinitely more to me than that. It is healthful and invigorating food to my literary self. This simply means that to deprive me of such literature would be to "starve" that within me which yearns for something beyond the mere or less humdrum existence to which we are—may I say it—physically held.

As a child I was thrilled when the knight rescued the princess; as a lad I marveled at the imagination of Jules Verne. But as a man, the fantastic faded. Gradually I came to see beyond the veil, to glimpse the cold fact of future possibilities. I like to read science fiction with this last in mind, feeling that the writer has the same viewpoint. I need only mention that the fiction of yesterday is everyday commonplace today.

I believe that the magazine of true science fiction is a standard scientific textbook. To the one who is making the light of scientific knowledge, science fiction is the broad and pleasant avenue toward the goal. For the layman to be well posted on scientific matters is to be well read on science fiction.

A few months ago I could not understand the fourth-dimension, that is, as the scientific world regards it. Today I do understand it, as it is understood in theory, of course, and I owe it to science fiction. True, the majority of writers are practically individual in their theories, but by weighing these and comparing them one can eventually reach the general explanation.

To the earnest reader of science fiction the world takes on new aspects. The weakness of humanity in becoming too familiar with the world as it is. The curse of advancement, I believe, is through science fiction, and as I read I look upon the things of today as old things, while the new is yet to be attained.

My worldly self rebels at the thought of whirling worlds within the atom; yet there is that within me which believes. The disbelief lies in the tendency to accept only that which we can see and feel, and otherwise comprehend through our five senses. This tendency grows upon us if we neglect to pierce beyond the commonplace.

To me science fiction is the door to the world of explanation. It is the telescope that reveals the glimpse of future achievement, the microscope that reveals the fundamentals in that achievement. Through science fiction I can sense the harmony of a world growing ever better and better of a humanity of brotherly-love, of a civilization nearing ultimate perfection. True, science fiction is a harsh master. It is no respecter of beliefs, being rather, through what has been termed extravagant fiction, a reminder of cold fact. Yet to me it is a pleasure to be so reminded of the task that is before us, of the old that is about to end of the new which we must attain.

Science fiction means to me all that is worthwhile, for it is the forerunner of that which is to come. It is the ship upon which I sail uncharted seas, and the ship that brings me home again, a better man because of the knowledge I have gained what were once unknown lands. But I am not a "landlubber," and I am hardly safe to set sail once more. So here goes for the unknown again.

B. S. Moss,
Wellsville, N. C.

First Honorable Mention

Tremendous Contribution to Civilization

Science fiction is a wonderful new art. It displays new vistas, new ideals, new worlds. It lifts us above the dull, painful routine of the work-a-day world into the glorious realm of limitless romance. It carries us to the land of our dreams and lo! they are dreams no longer, but splendid, fascinating realities. Dreams moulded into concrete life! Dreams solidified into definite realities by the scientific touch woven into the delightful pattern of the dramatic plot, colored with the magic of literary style, enhanced with vivid illustration—until we forget they are dreams!

There lies the appeal of the science fiction book. The cover's promise of weird and thrilling adventure! Likewise the illustrations. Stirring emotions resulted by the word! Throbbing memories of a thousand worlds of romance! Living hope, vibrant expectation, of visits to spheres unseen and new! Certainty of meeting the real living forms of a million ideas whose vague shadows have flitted, dim and indistinct, through our known alone youth!

In an illimitable universe, through time, there is a mathematical certainty that every possible combination of circumstances will be actual fact. Then every science fiction story, with a feasible basis of fact, has been or will be true. To be sure, we do not often meet the story that is perfect in proven fact—if it were, it would not be science fiction. But all science fiction, in a larger sense, is true.

It is the space flier that bears us most often to the world of golden adventure. It is as real an achievement as the locomotive or the airplane. Science discloses a wide universe. When man has found means to explore it, he has conquered his environment. The space flier is a great creation, even if one is over faith. The release of the mind from the earth to which it has been eternally chained has a real spiritual, inspirational value. That is the great gift of science fiction.

And the realization of the space ship is a definite possibility. If the progress of the last century is multiplied through ten thousand years, the result is beyond our comprehension. Fifty years ago gunpowder was the best force Verne could find for the propulsion of a rocket to the moon. Already such possibilities as radium and the disrupted atom have been added. Slowly we come to understand space and gravitation. To understand completely is to master. Science fiction has met and solved every problem connected with building a machine to guard man against the cold and the emptiness of space. The proposition is ready for the inventor. In the space ship, science fiction has made a tremendous contribution to civilization. And it is but an outstanding one of a thousand creations, many of which are already realized.

Daily science fiction gains popularity. That is because it explores the new frontiers. Man has conquered the sea and the air. The last blank spaces vanish from the map. In the march of conquest, we turn to other worlds. Human interest has suddenly expanded beyond the globe. For all the ages man has gazed in wonder at the riddle of the moon, and left the mystery of the stars to unanswered space. Now he thinks of conquest.

A new era dawns. Dreams of men reach out to other worlds of space and time. The new unknown of science is calling. The ships of men will follow his dreams as the sea-roads followed the dreams of Columbus. Science will answer the call, with a thousand new inventions—inspired by science fiction.

Jack Williamson,
Elida, New Mexico.

Second Honorable Mention

A Scientist-Author Speaks

To the scientist no class of fiction has a love even approaching that of carefully considered and well written science fiction. The scientist has a keen and highly-trained mind. His mentality is the bit of tools with which he earns his living—and, since he is alive and is a scientist he must have kept his tools in good working order. His very lifework is a search for truth, for knowledge, for an explanation of one or more of the phenomena which, from their very commonness, are of no interest to the man in the street. Being a scientist, his mental attitude is one of inquiry, and everything that enters the portals of his mind is subjected to an incisive intellectual analysis.

To the mind of this type the fiction offered by the ordinary magazine has little appeal. The scientist is ordered and precise in habit of thought—thus poor workmanship, loose writing, carelessness, and incoherence in his fiction will not be tolerated. He does not consider the "high-brow" magazine worth while—while the workmanship is masterly, the material is too often valueless. What shall he read? The eternal triangle leaves him cold. In general, he is married; parenthood has a family grown. He has been married to one woman for years; he knows real marital love, deepening and becoming richer with every passing year. He is intrinsically decent, and knows that the vast majority of his fellow-men are likewise decent. Why waste time with such trash? Shall he read the classics? He is already thoroughly familiar with them, they hold nothing new. Love-stories? Once in a while he enjoys a real love-story. Detective stories? Occasionally. But none of these really satisfy him. The end is always clear, from the beginning—these stories were written expressly for readers having a low level of intelligence and have no appeal to the mind of which our scientist must be the possessor.

In order to keep pace with his science, the scientist must read half a dozen highly technical journals, each page of which requires the concentrated force of his intellect. Since no mind can be driven at top speed continuously and still function efficiently, it follows that the scientific mind, above all others, requires relaxation. His needs reading that does not necessitate a great deal of concentration, and yet material sufficiently deep to hold his interest.

To this seeming paradox there is only one answer—SCIENCE FICTION. Real science fiction is written by men with trained minds—no other type of mind can write stories of that caliber. It is well-written and carefully thought out—no poorly-written story is accepted by "our magazine." Above all, science fiction soars far above the practical, into the realm of the theoretical and oftentimes into the realm of the impossible—realms in which the scientist always has been most intensely interested. The stories themselves are entrancing, simple as fiction, and are thus of interest to any twelve-year-old, even one who cannot think at all; and yet under them and through them are found the accurate foundation and steel framework of science, to which the scientist may penetrate if he pleases, and upon which he may exert as much or as little thought as he wishes. And the scientific mind, even in its moments of relaxation and without conscious effort, automatically digs deep. This fact explains the charm of science fiction for the scientific mind, and also explains the lack of appeal to that mind of ordinary fiction. For in science fiction no one really knows the answer—least of all, the author, for he has studied it the most.

To the non-scientific—to those who regard

the calculus an advanced mathematics—mathematics is an exact science. The scientist to whom calculus is simply a useful, everyday tool, and who thinks of celestial mechanics when the word "Mathematics" is mentioned, knows how far from being an exact science it really is. He knows that small differences in basic assumptions, not susceptible of proof, may lead into wide divergences in conclusions. He knows that the foremost mathematicians and the most eminent physicists disagree among themselves, each with perfectly sound mathematics to prove whatever point is at issue. He knows that no human being can understand time or space, and that no mind has as yet arrived at any fundamental knowledge of the nature of light, the presence or absence of the ether, or the ultimate constitution of our commonest substances.

Knowing these things, he reads science fiction avidly, and, if the author's treatment of some phenomenon is not precisely in line with his own ideas upon the subject, he instantly writes a long and fervent letter to the Editor—shrieking aloud, as scientists are prone to do, that that-and-so is absolutely and positively wrong; that it most certainly should have been this-and-that, and nothing else. Even though he is ordinarily meek and mild, and the readiest of men to admit his own ignorance; and even though he knows full well that no human being really KNOWS anything of a fundamental nature; yet he is very apt to be thus caustic and thus dogmatic when an author of science fiction violates one of his favorite scientific ideas. This idea may be some theory, some hypothesis, some tenuous scientific figment which probably can never be proven and which indeed, in all probability, the ultimate analysis will prove a fallacy. Nevertheless, no matter how nebulous the conception may be, some scientist will proclaim it from the housetops as the one and only incontrovertible scientific fact.

To sum up, the charm of science fiction to the scientist lies in this:

He is sure, before reading a word, that each author in each new story has given Nature's tail some new, interesting and entirely unexpected twist.

Edward E. Smith, Ph.D.,
31 Ripgan Avenue,
Hilledale, Mich.

Without Fiction There Cannot Be Fact

Man, the vitalized erected—what is he, whither is he bound and why? Descartes wrote: "I think, therefore I am." But was he, and are we?

All this clamour in the pot to evaporate, or to brew a greater future. It will evaporate into dogmatic mysticism unless we cleave to the law, the quantum, the test-tube, finding tomorrow that the truth of today is false, or that in the false there was a blinding truth. By tirelessly theorising, by plumbing and reaching outside the narrow confines of fact, we may hope to probe the veil of mystery that shrouds the infinite.

This is why I read science fiction, why I find in it a higher destiny designed by those who *foresee* for those who prove and demonstrate the *foreseen*.

All laws of chemistry, of biology, of mechanics once were fictions of those sciences. Without fiction first, be it the magazine kind or the hypothesis of the master mind, there can be no fact, which is obvious. Imagination alone pushes back the frontiers of the unknown, and there is nothing so splendidly energising as contemplation of that which no man yet has seen save in the crystal globe of the subconscious mind.

From the prognostications of such daring imaginers as throng the pages of scientific fiction will come definite leads to astounding discoveries. It seems scarcely credible that there never will be space flyers, and who knows but that genius impregnated with the visions of what now is extravagant fiction may coalesce in that future inventor of the space flyer?

Knowing one reads in fantasy what is probably for his descendants, one feels thereby that he rises so much farther out of the crude earthly mold in which he is fashioned. This animated dust, this absurdly compounded engine of light and air and sun which is mankind—what can it bravely pronounce impossible? Nothing. He who denies the theory he cannot disprove only stamps himself with narrow ignorance, or lack of imagination and constructive mind.

Therefore, readers and unbelievers, all propagandists of bigot and crass conservatism, disprove that space cannot be spanned, disprove that evolution cannot be hastened, disprove that man cannot treble and quadruple his present intellectual capacity.

This and more scientific fiction means to me. Beauty of greater worlds than ours, inspiration for higher groupings, the poetry and theory and the furtherest most splendid upreaching of our kind, that shall by science endure, that shall without science or without decadent science, surely pass away, back to the mute dust from whence it came, as did those unenlightened hordes which left their dim traces in the fossilized strata.

R. F. Tesher,
Mound, Minnesota.

Lives With His Authors

Science fiction deals with what for a better name I shall call New Thought. It deals with what I believe shall in time come true. Maybe not in my day, but some time in the near future. Take for instance Jules Verne. In his stories most all of the things he predicted have come true and some things are still coming true from day to day.

I truly believe that in time most of the stories that are of a scientific nature will come true, though they are still a few years ahead of our time. So I repeat that science fiction means *living at the present, in the future*. There is not a doubt that what I am now writing will prove itself as the future rushes upon us who are here now.

To Live Is to Think, and To Think Is to Live. So the stories that are written in science fiction give both to the authors and to the readers the privilege to live and to think as their fancy may desire. So when I read some real good story I live right along with the author. Live with him as he was when he was creating that story out of the storehouse of nature. His stories will come true, but in most cases it will never be recognized that the ideas for future inventions were written years before the inventor got his ideas. Anyone reading science fiction stories as edited the way you have in the past must live some of the things the author wished them to live.

These lines are not written to take any prize money. They are for the purpose of keeping a real science fiction magazine on the market so that those who feel as I do may, have the privilege of reading the stories of the future; living to think and thinking to live. Wishing you all the success that can be given in free-will, with many thanks for the stories of the past.

Frank H. Dunfee,
2629 Valleta Street,
Bellingham, Washington.

Stimulates a Thirst for Knowledge

In the first place science fiction has helped greatly in broadening my knowledge to such an extent that I really take it as matter of fact necessary in the betterment of future life.

I may possess highly imaginative foresight about things that science has yet to conquer, but I firmly believe that within the next few decades science will have produced many things worthy to marvel at. Mankind will be well repaid for its efforts by bringing us a few steps closer to the pinnacle of perfection for which mankind has been striving to attain for ages.

The road that leads to the ultimate in science is steep and narrow but is well worth trying for.

Science has lifted the ignorant and superstitious to a better living and nobler ideals. Science fiction has done more for me perhaps than any other writing in that it has made me think more and helped to stimulate my imagination. Science fiction has opened up a new and unexplored vista for me and I hope for many more instructive as well as entertaining hours of enjoyment. It has kept me occupied for hours at a time. It is like water we thirst for, but in thirsting we gain everything and lose nothing. I am for the success of science fiction and I earnestly hope that there are many more voicing the same cry.

George P. Troyer,
209 N. Marshall Street,
Lancaster, Pennsylvania.

Science Knowledge Necessary for Living

This present age is the mechanical age. Airplanes, airships, and all these other various methods of transportation are being used extensively.

The approaching age is going to be the scientific age. Everyone will be required to learn a certain amount of science in school and when they grew older, they will have to have a more than normal knowledge of science in order to get on in life. For in the coming era science will be accomplishing interplanetarian transportation, etc. Everything will be made modern by the different inventions of science.

Along with science comes its mate, science fiction—this new method of teaching people science by an intellectual way, and also in a way that people would enjoy. Science fiction brings to you the knowledge of science in a different way than just dry study.

Science fiction gives you ideas of inventions never dreamed of today and as you read about these inventions, you will have the desire to invent something beneficial to mankind.

I think that every American boy or girl should read any science fiction magazine, and when they do, you will see the result.

S. Weinberg,
4 President Street,
Far Rockaway, N. Y.

The Breath of Life

Science fiction to me is a vision of what the future may bring. Furthermore it opens up great possibilities, and gives us ideas, which, if we grasp may enable us to perfect our understanding of new things. Then, again, our science stories allow us to travel into the future, and wander through our planetary system, as well as into the outer parts of our vast universe. To me, as we read science fiction, Time and Space is already conquered, in our minds at least. I have read somewhere that what is possible for man to think, some day he may do.

We look to science fiction to give us ideas that will some day enable the races of the earth to unite in one body and with the massed intellect of the world carry us forward to an Utopian world.

A few pages devoted to latest news and discoveries in science will enable our authors to pick up new ideas, and reverse some of their old ones. Science fiction is already driving our authors forward into the future, and further into the next universe. Now that is all on that subject.

I would like to compliment you on your wonderful story, "Ralph 124C41+." I think this is the best story I have ever read. I have no fault to find with it.

Owing to heart trouble caused by rheumatic fever, I am very interested in Ralph's experiments with his dog as well as the one he made on his sweetheart. Of course I don't see how it can help me, but I am only 27 and full of hope that some day scientists may, by some wonderful surgery, cure me.

Roy Wicks,
Telkwa, B. C., Canada.

Imagination Necessary to Greatness

Science fiction means to me a world apart from that drab existence which confines us daily. It is a flight of fantasy, yet such a fantasy as to be productive of results, *for he who refuses to go beyond fact rarely attains fact*, it is in the future of a pathfinder or trail-blazer for the progress of science, and for that matter, of the world. It stimulates imaginative minds to invention and discovery, "*sine qua non*", and last, but not the least, it is a restful diversion from unrelenting routine. It is for these reasons, outlined above, that I appreciate science fiction.

If any one should tell me that I am foolish to waste my time on reading science fiction stories, I would know at once who is the fool. It is highly probable that men such as these will never rise above an ordinary level. On the other hand, if you will look into the lives of great men down the ages, you will seek in vain for those who lacked imagination. Can any other argument for science fiction bear more proof? The world itself presents her testimony for it and the histories of illustrious men are witness to it.

Science fiction cannot die, as more than civilization can cease to advance.

Edward Alpert,
1273 Dewey Avenue,
Price Hill, Cincinnati, Ohio.

(Continued on page 98)

IN this department we shall publish every month your opinions. After all, this is your magazine and it is edited for you. If we fall down on the choice of our stories, or if the editorial board slips up occasionally, it is up to you to voice your opinion. It makes no difference whether your letter is complimentary, critical, or whether it contains a good old-fashioned brick-bat.

All of your letters, as much as space will allow, will be published here for the benefit of all. Due to the large influx of mail, no communications to this department are answered individually unless 25c in stamps to cover time and postage is remitted.

So, We Are An Exception

To the Editor:

My first word is "congratulations!" Your venture struck a responsive chord in my heart, so well indeed, that I am enclosing $2.50 for a two-year subscription. All on faith, too! I have never seen and now do not know what this new magazine is like, but I am willing to trust on your reputation to give me more than my money's worth.

I read your science fiction magazine for one reason only, to travel in the realms of fantasy. Call your magazine—it makes no difference to me, I have no reputation to lose. I am merely a poor lowly college student, trying to get the most out of life. I sure try hard! But physics and chemistry are trying to ruin my happiness. I like them so much that I spend too much time on them, thus forfeiting enjoyment along other lines. I have taken many vows. One I have kept, anyway. I never read those pseudo-scientific books or magazine. If I want knowledge I go to journals or textbooks.

"Now," one might say, "why do you read science fiction?" Alas, I must confess! Not for knowledge but for pleasure. It is great fun to sit down and read the works of some embryonic philosopher who thinks the world can be saved in only one way. Also to read of a man liberating atomic energy in a thoroughly impracticable manner.

But what of it? It broadens my mind and strengthens my imagination. Who knows that some day, perhaps, I might explain the phenomena of solutions of light of electricity all through the reading of "filthy trash" (kindly of course). Would that not be a gift to mankind that science fiction might well be proud of! It will then not only be the pioneer but the beacon, lighting the way to an astounding discovery.

So closes my letter if so it may be called. It seems to be rather lengthy for one and entirely a jumble. But jumble or not it is written from the heart, and that, after all [illegible]

And so at the conclusion of this lengthy letter, I congratulate you again most heartily on your new project, and wish you a belated adieu.

Please don't put into the magazine that science news department. It spoils the magazine as the questionnaire did the other. It escape the web of romance woven by the stories by trying to put a practical value on them. It shouldn't be done. If one wants news of the science world they should read the journals and get it first-hand.

Herman Finkelstein,
1461 54th Street,
Brooklyn, N. Y.

(Some of our friends would be interested in seeing Mr. Finkelstein's letter. He, like thousands of others, subscribed to a magazine that had not yet been published and *HAD NOT EVEN A NAME*. As he says, "It was all on faith." This faith in our reputation, we consider a priceless thing. We are glad to note that Mr. Finkelstein is added to the swelling list of scientists and students who consider us an exception to the rule of "no fiction." We wish to state, however, that many men and women do not have leisure enough to wade through the many scientific journals necessary to keep abreast of the progress of science. It was for this reason that we established the "Science News" department. So that "he who runs may read and profit." We would like to know what Mr. Finkelstein thinks of the first issue.—*Editor*).

An Honest Difference of Opinion

To the Editor:

I am enclosing a check for $3.25 for three-year subscription for your new magazine.

Am taking a chance on this, not because I am so delighted with your editorship, but because there is so little on the market in the nature of scientific fiction that I am willing to put up with the bad in order to get some of the good.

One particular matter I object to is your concealed slaps at labor, such as in "Ralph 124C 41+ something or other" and your vicious attacks on communists such as the dirty slander about Dubovhinsky, the title of which I forget, but which you probably remember.

However, I know better than to expect an "intellectual" to be fair to workers in general and to left workers in particular, so I put up with it as at present there is nothing better.

As to your ability as an editor or writer, I have no quarrel, but as to our ever agreeing on fundamentals, I fear it is impossible.

I put up with you as I crave the type of fiction you put out, thought I detest your communist theories, and I believe that knowing my ideas you will also tolerate me, as under this best of all possible systems, the main thing is to get the jack. Even Sir Henry Deterding is willing to compromise with the Bolshe Bandits when necessary to protect his profits.

Hoping you save my feelings from further laceration by such rot as I mentioned concerning Dubovhinsky, I am,

W. Mellenhauer, Jr.
Detroit Federation of Musicians,
804 Merchants Building,
Detroit, Michigan.

(We admire Mr Mellenhauer for his frank statements voiced, we are sure without ill-will. We believe that he speaks quite aptly when he mentions the necessity for tolerance. But not, as he says, "to get the jack," but for finer and freer living for everyone. We must certainly put out our hand of appreciation to Mr. Mellenhauer for his splendid support and hope sincerely that he enjoys the reading more than ever.—*Editor*).

From the Canadian Snows

To the Editor:

Herewith enclosed please find $1.10 for one year's charter subscription to your new monthly; and here's wishing you (and your paper) the success such an adventure merits.

We fully endorse your suggestion of a scientific article each month—please make it a good one. This you can do, we know quite well! Only please don't be too technical!

Re the name. We do not like any of your suggested ones.

Hence we would suggest a name entirely different—such as *The Pioneer* or the *Cyclops* (single eye) or something like *The Universe* or *Looking Ahead* or *The Vision*. We submit these ideas for your consideration.

Reading matter is precious to us in Canadian snows. My husband joins in this letter and sends best wishes for the new magazine.

Mrs. Eleanor B. Gill,
Lacombe, Alberta, Canada.

(Mrs. Gill's suggestions are gratefully received. We hope to hear from her, letting us know what she thinks of the name, SCIENCE WONDER STORIES suggested by so many readers. To fill the reading needs of one in the Canadian snows is indeed a hard task, for the material must stimulate interest and yet not become tiresome or monotonous. That we can accomplish this is indeed a compliment.—*Editor*).

Casts Out Ignorance and Fear

To the Editor:

I have been reading your magazine since the early issues of the *"Electrical Experimenter"* and I am greatly indebted to you for the knowledge of the sciences which I have learned and studied due to your helpful items.

In regards to science fiction, I can only state that it is the "revolution" the REAL revolution, that the thinking world needs, the freedom from the ignorance and superstition that have for ages kept man in religious slavery. Facts and truth have always been kept from man.....always we were taught (and ordered!) to bend humble knee to the false gods and creeds, to the monsters of our own creation, never to ask why or to doubt. As people read they become educated, become acquainted with the "mysteries" of our little world. No longer do we marvel at the radio, airplane, automobile, and the countless commonplaces of our age. They are REAL, natural! The telescope and microscope have given to our eyes the wonders that formerly were out of sight. And so does the science fiction stories, open our eyes and minds to the possibilities to which our imaginations will some day realize. Science is rather a dry pill for most folks to swallow, and the logical and pleasant way to "get it down" is through the vehicle of the novel and story. Through this type of story and its worth of science I have become equipped with an outlook that casts out ignorance, superstition and religious fear. This is what science fiction means to me.

Stanley G. Stein,
630 N. New Jersey Street,
Indianapolis, Ind.

(Mr Stein strikes a note which we believe will re-echo through thousands of our readers. If by casting out ignorance and fear, by picturing what our world is like and what it is likely to become, we can make it a better place to live in, we shall consider that our reason for existence has been accomplished.—*Editor*).

Don't "Kid" the Reader

To the Editor:

I am enclosing check for $2.00, and filled in blank for 2 years' charter subscription, which is evidence I have faith in both your integrity and ability.

As you have always been glad for suggestions, I wish to offer the following regarding the new publication, many of which should apply to all magazines.

1. Decide on some convenient length and width for the magazine AND STICK TO IT. Don't change size. This size-changing seems to be a favorite sport of many magazines, and it makes it difficult to bind or store complete issues.

2. Be sure and PUT THE YEAR NUMBER, as well as month number on the cover of the magazine, and make it prominent.

3. Do NOT put a science section in the magazine, which is a straight fiction proposition. You might possibly put in an article which particularly applies to some story in the magazine, but a general science section would duplicate what most of the readers get elsewhere. (*Where can you?*—Editor).

4. As far as possible, run complete stories on consecutive pages, advertisements notwithstanding, and go easy on "Continued page—," etc. I understand of course that this is done principally so that readers will have to look at the advertisements because the story column is sandwiched between them, but I doubt if it fulfills its purpose.

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[redacted] .....

Address .....

City .....

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5. And keep on, as in the past, stating by each story if it is complete in the issue, or continued AND FOR HOW MANY ISSUES IT IS TO RUN. Furthermore, never run a story for more than three installments, and as far as possible start and finish stories in harmony with volume numbers or quarter or half numbers, and use a logical system in keeping track of the volume numbers. To illustrate:

If possible start Volume 1, Number 1, on the half year or year, or at least on the quarter year, as you did before. If it were possible, I would like to see the new magazine started with the July, 1929 issue, on sale about June 1, 1929, and Volume 1 to finish with the sixth or the twelfth issue from then, and the continued stories so spaced that part of the story would NOT be in Volume 1, and part in Volume 2. Do not start with May and a new volume number in November, etc., etc.

So many magazines (smutty and otherwise) try to kid us. For instance, by taking a publication about 2 years old and in some way running the volume number to about Vol. XIII—No. 3. And then absolutely refuse to state by a story if it is continued, and for how long it is to run.

6. In the new magazine, do not duplicate stories which have run in your old publication.

And if I were doing it, I would print some hundreds of the first 3 or 4 issues and save them until the magazine is a couple of years old, and then sell them to those wishing to complete their early files, at about 50c a copy, which would be fair.

With best wishes for your success and the early publication of the new magazine.

E. L. Middleton,
2134 Magnolia Court,
Los Angeles, California.

(We thank Mr. Middleton for his intelligent and carefully thought out suggestions. They shall certainly receive our consideration. We question, however, his statement that the reference we give him can be procured elsewhere. The fact of the matter is that we ourselves must peruse some forty-two odd periodicals in order to assemble what we give our readers. We agree with him heartily however when he says, "Don't kid the reader." Our reputation has been built up on twenty-five years of fair dealing with the reading public and that reputation is what we will guard before anything else.—*Editor*).

A Pleasant Command

To the Editor:

Attached my check for a year's subscription to "science fiction." You see that I have already named "our" publication.

The way I look at it is that your editorials alone are well worth the price, and then some, and a hell of a lot of some.

What do I get out of science fiction? A bunch of ideas which would never revolve in my poor brain, ideas which make me study and visualize.

I am a very poor sort of an amateur in astronomy, and it is with pleasure that I read articles, even though fiction, on Astronomy, Space, Time, Relativity, Fourth Dimensions, etc.

Would like very much for you to consider the following: Allow about two pages in each issue, with sky map for each issue, naming the constellations, and important stars with a short description of them, as, distances from the earth, dimensions, temperature, etc. Also photos of clusters, nebulae, moons, planets, etc. That is a large order, but at the same time, the publication would be of immense aid to amateurs throughout the country. If you don't do this, I'll not be mad. Just a suggestion.

Here's wishing you the very best of luck in this important undertaking, that all of your old family rally to your colors, that you put this over as none ever was before.

P. S. Don't forget your *Editorials*, if there are any missing you will hear from me in a plain Rebel's language.

F. B. Eason,
400 Jefferson Avenue,
East Point, Ga.

(Mr. Eason's letter came to us with a picture of the ringed-planet Saturn on his letterhead. This indicates a strong interest in astronomy, which we believe is one of the most fascinating of sciences. We have taken Mr. Eason's request under consideration, and assure him at least that his command for an editorial has been voiced so overwhelmingly by our readers that we cannot disobey.—*Editor*).

Finds Romance in Scientific Imaginings

To the Editor:

Having grown to associate your name with "scientific fiction," I am with you in your new venture, and here's my backing to the extent of a year's subscription. I have also given considerable thought to your questionnaire, and hope you will do the same for my suggestions.

Title. Personally I like "Science Stories," but I'm afraid it sounds rather cold. How about one of these?

1. Cosmos
   Stories of Science and Imagination (Suggests stories that deal with the forces of the universe. I think it ought to make the mental mouth water.)
2. Wonder Stories
   ("Wonder" is the basis of scientific research.)
3. Cycle—Stories of Time and Space.
4. The S. F. Magazine. (Science-Fiction).
5. Science and Adventure.

Cover. Instead of illustrations I suggest a modernistic design. This would attract attention without offending good taste. Designs like this are simple but effective. There seemed to be a strong prejudice against changing either the name or cover of your old magazine, so I never wrote them, although dissatisfied with [redacted].

Type of Stories. Adventure, whether among worlds or among atoms; past, present or future; in the laboratory or in the jungle. The stories should grip both the mind and the emotions. There are two pitfalls to be avoided: Do not sacrifice story interest to scientific detail. (Why not block the very technical parts off in small type? Descriptions of machinery, etc.) It is not necessary to work love affairs into the stories to make them readable, as some writers seem to think. Considering it from a psychological point of view, the readers of this magazine are going to be more interested in the the romance of scientific imaginings than in the romance of man and woman, unless that too were handled in a scientific w[redacted]

Science News. By all means. Your old readers wanted this, but then they had to buy *two magazines to get it.*

I have every copy of your old magazine, both monthly and quarterly, so you see I am really interested in this type of fiction. Long life and success to the new magazine!

Helen M. Reid,
504 Forest Avenue,
Cincinnati, Ohio.

(Miss Reid is one of the many who have suggested WONDER STORIES as the name for our magazine. As she indicates, wonder or curiosity is the basis for all scientific research. It has, in fact, been the greatest single force that has lifted man from his brute beginnings to the present state of civilization that he enjoys. And spreading to all classes, wonder is the force that will carry us on, up the long path of our destiny.—*Editor*).

He Grew Up With Us

To the Editor:

I have been an enthusiastic reader of your publications for the last 11 years, i.e., since 1918 when I first subscribed to the *Electrical Experimenter;* I was eight years old at the time. So you see, I've been (metaphorically speaking) brought up on your publications and I'd think it, well, almost a crime if you were to cease publishing.

For the past two years I have taken but three magazines, Physical Review, Scientific American and your science fiction book. I am not trying for the $50.00 prize, but I'm going to tell you (for what it's worth) what science fiction means to me. Science fiction is one of the most pleasant forms of mental relaxation that I know of, as it allows one's mind to relax without leading it too far away from one's favorite subject, as other forms of relaxing most certainly do.

So go to it, make a success of it. I'm good for five years.

Stephen L. Brown,
Framingham Center, Mass.

(As Mr. Brown says, he is an old friend, and like one, he has worn well. There must have been something real to carry him with us from the ages of 8 to 19, for we understand that during that period the reading tastes of a boy changes four or five times. And as Mr. Brown grows older he will have no need to leave us behind for we will be growing right along with him.—*Editor*).

Admires Real Fighter

To the Editor:

I am enclosing herewith an application and check for $2.50, covering my subscription to your new magazine. I certainly must congratulate you upon your efforts to continue in the publishing business in the face of what might be called defeat. I have always admired a real fighter and by that I mean one who can go down and come up fighting harder than ever. I'm with you tooth and toenail. I have much faith in you and in your new venture and I hope that the forthcoming publication will meet with instantaneous success.

Within the next few days I hope to send to you another science fiction yarn that in my opinion ought to "click" as we say in theatrical parlance. Of course that is my opinion, but it will be yours that counts. However, this yarn is a real American adventure and has to do with the mysteries of Death Valley. I have a great desire to be considered as one of your authors and to that end I am working tirelessly.

Meanwhile, I'm going to speak to many of my friends here about the new magazine and I hope to be able to promote some new subscribers. And it will be with interest that I will await the first issue which I sincerely hope will exceed the public's fondest expectations. I am sure that it will eclipse all other similar magazines.

Again I wish you all the luck and success in the world.

Ed Earl Repp,
3046 Field Avenue,
Los Angeles, California.

(This letter from one of our promising authors, speaks volumes for his feelings. We want him to know that our fight to give our readers the best science fiction magazine in the entire world is meeting with success, thanks to the splendid cooperation of the readers. We all await Mr. Repp's manuscript with a great deal of interest and curiosity.—*Editor*).

"They" Should Read Our Magazine

To the Editor

Science fiction is a very worth while and good thing. I know many people who do not expect any new developments of science in the future. When I mention a theory about an engine running by sun-power or by gravity powerful enough to run a factory, they laugh and say that men cannot harness nature's forces. But this is a very reasonable theory because such machines have already been invented and only need perfection. To them a theory about a machine to navigate space or to prolong life is pure madness. But such things are bound to happen and I hope it will be soon. I like science fiction because it gives me stories of what is to come.

Peter Pastorius Nelles,
New Haven, Connecticut.

(As Mr. Nelles realizes there have been some scoffers in every age. Those people who are unable to grasp what they do not immediately see, have acted as brakes on the world's progress. But the wonders of science that surround us on every hand, must indeed fall upon a very dull and blind mind if they do not awaken the realization of what wonders, greater by far than what we have, are waiting for us in the future.—*Editor*).

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A. HONIGMAN, Sta. E., P. O. Box 45,
Dept. SWST, Montreal, Canada.

Recommended by Teacher

To the Editor:

A plain, ordinary farmer like myself is very likely to be taken up with his every day affairs and lose his imagination unless he has some inspiring force to lift him out of the rut and urge him on to greater accomplishments. Such a force is embodied in science fiction stories of the type contained in your magazine.

In my own case, I have read your former magazine since November, 1927, when it was recommended to my chemistry class by our able teacher, Mr. P. M. Hammond, B. S., as a source of entertainment combined with no little educational value. He said that the stories contained many statements which were scientifically correct.

I have found this exactly as represented, and have divined more real pleasure from it than any other I have yet read. Naturally, I am sure that the new magazine will be all that the old one was, and more.

Along with my subscription to your new magazine, I am sending my best wishes for both your and the magazine's success.

Nyle L. Katz,
R. F. D. No. 2, Marshall, Mich.

(The experience of Mr. Katz is typical of many letters that we receive from our readers. Enlightened and forward looking teachers are recognizing that the stories we publish are designed for education as well as entertainment. And how can one be educated better than to receive his instruction in an imaginative form. —*Editor*).

WHAT SCIENCE FICTION MEANS TO ME

(*Continued from page 90*)

Helps An Experimenter

For the few years past I have been subscribing and collecting stories of science fiction and the future. Science fiction means to me a help in the evening, by that I mean that when I come home from work I can read my troubles away. Science fiction has shown to me the ways of experimenting. Many people think that such stories are just lies and out of use, but I, who have been reading science fiction stories and experimenting, have been helped greatly along that line. I know that some day the world will say what science fiction meant to it. It has told truth from lies just as when Jules Verne wrote "Twenty Thousand Leagues Under the Sea," he prophesied the submarine. Yes, sir, I know what science fiction means to me, and what it may mean to and for the good of the world.

Michael Cangelosi,
7 Prince Street,
New York City.

Unequalled in Literature

Science fiction as a word explains itself. And that, first of all, is exactly what it has meant to me. Science in a readable and interesting form, in which theories and facts become characters and abstruse ideas, actualities. Science fiction has given me a general knowledge of science which I could have gotten in no other way. It has kept me abreast and ahead of the science of today. It has given me something to look forward to—the steady fulfillment of its prophesies, and something to make me think.

I have only received a high school education and have never had any particular leaning toward any branch of science except fiction form, and yet, not long ago, a friend of mine, who is an electrical engineer and a graduate from one of the most prominent engineering colleges in the United States, informed me that I probably had a better general knowledge of science than many of his fellow graduates.

Science is cold, uninteresting and hard to understand. By itself it attracts few followers; but coupled with it something that appeals to the average person's love for romance, excitement and the mystery of the unknown—in short fiction and the result is something that cannot be equalled in the realm of literature.

C. A. Livingston,
Spencer, Ind.

"Bill, Meet My Lady Friend"

From the way she looked at him, he knew at once that he had fallen in her estimation. She didn't laugh—she was too well bred for that. But there was just a trace of a shadow in her expression—an almost invisible arching of her eyebrows. And she was the woman whose good opinion meant everything to him! He had tried to be cordial; his introduction had only been crude.

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Science Fiction Means Entertainment

"You should be a scientist, with your knowledge; why do you waste your time at that job of yours?"

The preceding statement and interrogation have been addressed to me a number of times, more or less varied, but of the same import. It occurs when an argument arises among my friends upon some scientific question, and upon which I join with my theories and whatever information I might possess on the matter.

The term "scientist" is rather a broad one, involving an infinite number of things placed under the heading of "science," and just what my friends mean where they use it, is quite a question. They have accused me of studying astronomy, geology, chemistry, physics, electricity and other subjects, and judging from some of their remarks they think I have a well-filled library of books on all branches of science.

All this is very complimentary, but contrary to the truth of the matter. The fact is, I do *not* study science, nor have I such an enviable library—which would be a luxury far above the average person's means. But I *have* a source of information—a source that is available to everyone. It is—*Science Fiction*.

Science fiction means, among other things, *entertainment plus*. It might be likened to Aesop's "sugar-coated pills of wisdom." Science fiction and "food-for-thought" are contained within the scope of this latest development in literature, as yet in its infancy, and which is ever-growing and improving. This fascinating creation spans the gap between amusement and instruction in a manner that never before has been approached.

Inexplicable as this accomplishment might seem upon its surface, yet as one delves into the matter, the reason at once becomes apparent. One has merely to look to the creators of science fiction. Where, in the annals of story-writing, has there been grouped so elite a list of authors? Writers of fiction, but not only that—*they are a scientific order in themselves!* Doctors, astronomers, psychologists, etc., well-known in the scientific world.

By way of substantiating this apparently extravagant statement I could write pages regarding these famous science fiction writers, but, as the familiar expression has it, space will not permit. However, I will, at random, name one or two of the authors of this new magazine, which is heralding science fiction in its true significance.

The first to come to my mind is Dr. David H. Keller, whose scientific volumes have created nation-wide commendation. Then there is Mr. Vincent Starrett, famous figure in scientific circles. It is a wonder that he finds time for all the scientific articles, which appear almost daily in different publications. A. Hyatt Verrill, well-known explorer, is another member of this famous group of authors. And so on, through the list, including the editor himself who, of course, needs no introduction. Mr. Gernsback's editorials alone are worthy of being put in book-form and entitled "Scientific Data." These editorials are in keeping with the rest in the magazine, interesting and instructive.

What does science fiction mean to me? That is a difficult question to answer in so many words. What does education mean to the ignorant—knowledge to the uninformed? What is a light to one groping in the dark? But science fiction means more than scientific information. It is not only "food-for-thought," creating a new interest and leaving a lasting impression upon its readers. It is not only a light which penetrates the semi-darkness of mediocre scientific knowledge.

Science fiction—unique, thrilling, stimulating, and startling to me means *entertainment plus*.

J. Lawrence Collier,
34 South Fifth Street,
Hudson, N. Y.

Learns Science Unconsciously

Science fiction is a very fascinating form of entertainment. Since the first day that I became acquainted with this new form of fiction I have been one of its staunchest supporters. And it is not strange that this should be so.

I belong to that class of individuals whose taste is satisfied neither with pure fiction or pure science. Pure science becomes dull and dry to me just as pure fiction and the ordinary type of short stories on the market today become monotonous in their never-ending similarity. But science fiction gives me both my fiction and my science in exactly the proportion that I desire them most.

I can ponder over the rules in any standard physics textbook for hours and get out of it for my labors, only a few rules the meaning of which I am none too sure. But given only one-half hour with a magazine of science fiction I can grasp the meaning of that same rule very quickly. It makes a very much clearer impression upon my mind because it is presented under the guise of fiction. You learn things in this way unconsciously.

The last sentence tells in a nutshell why I like tales of science fiction. I can truthfully say that I have learned more about Time, Space, Matter, Astronomy, Fourth Dimension, and the countless other mysteries of the Universe while reading magazines of science fiction than through any other means that I know of.

So you will see that there is some personal feeling in my wish "Long Live Science Fiction."

Neil E. Tasker,
122 So. Sixth Street,
Shamokin, Pennsylvania.

Opens Fields of New Power

It seems to me that science will always be one of the leading things of the age. Science will do everything from housework to winning wars, and will always hold an attraction for many classes of people. Some people are physically unable to explore who seem to have a strange desire to do so. But they are able to do so through science. Science is one field always open and which can never be completely explored. Science seems to act like a magnet and draws you to it, the novelty of it, possibilities of it and the wonders of it.

Science fiction gives people a chance to break away from the rut that the average run of human minds are always in. Science fiction gives a chance to open fields of new power, vision, etc., beyond all past human conception.

Sanford Gordon,
830 E. Sander St.,
Pocatello, Idaho.

Has More of the Unknown

What science fiction means to me. A little group of words that mean nothin more or less. Well, I reckon to understand exactly what science fiction means to me, you had ought to know just who "me" is and how come I am in any position to know anything about anything, or—in other words something about

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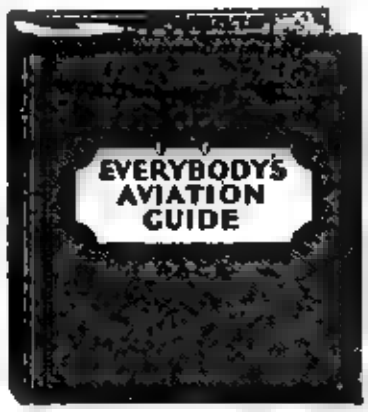

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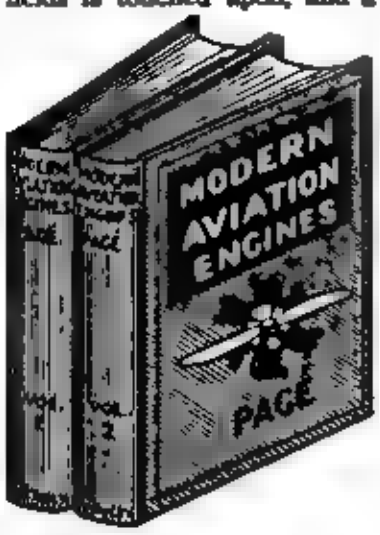

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something, or at least about the subject aforenamed.

Fellow-sufferers, I am a literary worm, *An American Literary Worm*. Nuff said. You'll know by that that I have sampled about every quality or kind of magazine now on the market priced anything below four bits. (I never go higher). I've roamed every magazine shop in town, looked at every book, even to the least attractive covered ones stuck away in dark corners, read stories here, there, and everywhere, all types; and, readers, I've finally stopped, looked, listened and sent in my subscription for OUR brilliant magazine.

Cause why? Well, that is the reason I've been gabbin' so long. Why did I finally step at science fiction and therefore in the same breath what it means to me.

Well, I'll tell you right now what it means to me. It means absorbing entertainment, entertainment that holds the interest through it to the last sentence. It means brilliant new thoughts exercising the old gray matter. I just have to set right down after such a story and reason it all out. And last it means education. For the stories are based on very little used facts which stick with us after we have thrown the book away.

But why is a science fiction story so much more attractive than ordinary fiction? Well, I think the best way to settle it is to analyze the attraction of it as compared to other types of stories—analyze it in the old psychological way. So here we go:

We are attracted to a story by a little call of adventure that is old as the hills. True, is it not? The millions of folks in cities that can't have much real adventure, have got to get it canned! Kinda like salt, gotta have it or life's not worth while.

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I can hear sniffs and hoots out in my readers from where I am sitting. But listen to reason. We'll compare them, what? All right, what'll come first? Westerns, I hear some one say. All right.

The log fire is smouldering warm and cozy. Snowy's pilin' up on the window-sills but what do I care. Tummy's full and pipe's smoking'. I feel the old, old call of adventure and the unknown. So I settle's down to my easy chair and picks up a handy magazine. It's a Western. Instantly a picture of a little ramblin' Western town filled with rambunctious, sky-ridin' sons of guns. The desert and mountings in the distance. Unknown, huh! What'll happen next? Why out yonder behind that rock hides Wild and Wooly Bill, ready to fill my pore hide fulla holes. He's kidnapped me best gal, besides swipin' horses, rustlin' cows, and whips his trusty steed cruelly. Unknown huh? Why, I'll oil my six-shooter up and go on the war trail.

Well, mystery stories, then. Ah, ha! Somebuddy's murdered. Not a clue! Just another unsolved crime. And here is our unbeatable detective. He alius gets some little clue, some overlooked fact, solves the murder, and then yaps—

Oh, gettin' tired of that. Air stories then, we are up in the air in the trustworthy old crate against immense odds. Oh, I'll not go into any more details but you see how it is, but WAIT. Shh! What if we set down to a science fiction.

We can't possibly know what we're gettin' into. Giddap, Nap! We're off for the unknown, and I'll lay we set on tacks till the end. Where to? No way of telling. Maybe to the moon, maybe to some other dimension, but *honestly, did you ever see two alike?* Attracts the attention, sustains and stimulates interest to the last. Puts over its little bit of romance and leaves us sitting, dodgasted, and thinkin'. That's what counts.

I could write all day, but I know you all are gettin' tired again, so just leaving you with the thought that science fiction has a larger scope of the unknown, is full of more true adventure, ambitious, health-giving and educational facts than any other magazine going.

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BOOK REVIEWS

THE SUN, THE STARS AND THE UNIVERSE, by W. M. Smart, M. A., D.Sc., 288 pages, 20 plates, stiff cloth covers, size 5¼x8½, published by Longman's Green and Company, London and New York, $3.25.

This book, which comes to us from the pen of the chief assistant in the Cambridge (England) University observatory, is a descriptive account of the universe of the astronomer designed for the man of the street. It is written in non-technical, non-mathematical language. Starting from a general account of the solar system, Dr. Smart treats of the relationship existing between each of its parts and the vast worlds that lie beyond the sun's system. He treats what is of particular interest to the modern world, the possibilities of life on the various planets, particularly Mars. The so-called Martian canals, said by fiction writers to be of human origin, receives much attention from the author, who deduces a fair possibility of human life existing on the planet. For standing in the evolutionary scale between the young, busy earth and the dead moon, Dr. Smart finds Mars in a decadent state with a great part of its life's cycle already run. If that is true, and if life does exist on it, then what writers of fiction have portrayed of the existence of a civilization older and far more advanced than ours, seems a logical conclusion. Certainly, the author believes, the climatic conditions of Mars, would support a progressive and civilized people. He also gives the history of astronomy, showing what our predecessors used as instruments and what they found with them.

THE PAGEANT OF THE STARS, by William J. Luyten, 300 pages, 32 illustrations, stiff cloth covers, size 5¼ x8, published by Doubleday Doran & Co., Garden City, New York. Price, $2.50.

A book for laymen written by a professor of astronomy of Harvard University, who has recently received the Guggenheim Medal for his contributions to science. Professor Luyten gives in a fairly comprehensive fashion the essential facts regarding our known universe; bringing his material up-to-date to account for the latest discoveries. He treats of each of the heavenly bodies in a separate chapter, attempting to show how each came into being, and the forces that govern its motion and life. He pictures the universe as a transient thing, dissipating into space its mass and energy without receiving any in return. The sun, for example, is losing weight at the rate of a trillion tons per second; and if we combine the radiations from all the galaxies, Professor Luyten finds that the world is losing a mass each day equal to the weight of the earth. He stresses the absolute insignificance of the earth in this vast universe—a universe that is slowly passing into nothingness. That, however, will be of importance to those who live many millions of years from now and need cause us little fear for our safety. On the whole "The Pageant of the Stars" is a very readable book for one who wishes a broad picture of the world in which he lives, and wishes to see it from the point of view of not only a scientist but also of a poet, for Professor Luyten undoubtedly is one.

THE TRUTH ABOUT MIND CURE, by William S. Sadler, M.D., 206 pages, stiff cloth covers, size 5x7½, published by McClurg & Company, Chicago. Price $2.00.

Dr. Sadler, who is well known as a writer of popular books on health and medicines, undertakes to explain the mystery behind the various types of faith-healing. Approaching his subject from a scientific viewpoint he find that there are two types of illnesses; the organic, such as tuberculosis, cancer; and the functional, such as diseases of the nervous, digestive or circulatory system. It is the latter and the latter only, Dr. Sadler contends, which can be cured by mental stimulation or suggestion. And that is because it is these diseases which have a mental basis. When an illness is caused by fear, worry, anxiety, depression, etc., it can be cured by an injection of optimism, cheerfulness, determination or faith. With a clear, incisive mind, the author traces the development of the various types of mental healing and attempts to show the scientific, or psychological basis of each. This volume should be very stimulating to those who want a simple, common-sense yet logical viewpoint of how the many faith-healing cults seem to make so many cures, where medicine has failed.

THE NEW REFORMATION, by Michael Pupin, 272 pages, stiff cloth covers, size 5¼x8, published by Charles Scribners Sons, New York. Price $2.50.

This book by the distinguished professor at Columbia University, the author of "From Immigrant Boy to Inventor," has the sub-title "From Physical to Spiritual Realities." Professor Pupin attempts the great task of reviewing the contributions to science of a half dozen great men such as Archimedes, Galileo, Newton, Faraday, Maxwell, Roentgen and Gibbs, and to find, from what they revealed about our physical universe, the unfolding of a physical and spiritual plan. He sees a great cosmic drama unfolded by these men, a drama which is still proceeding through newer and newer discoveries. Couched in a simple, yet imaginative style, Professor Pupin tries to show how the soul of man is being revealed through these scientific developments, how they are all part of the organic creative universe, which he believes is the work of a Divine intelligence. Whether one agrees or not with these conclusions, one cannot but be impressed by their wisdom and sincerity. And if the reader does not build a religious belief on his reading of this book, he will certainly have an intelligent basis for his disbelief. He will have, too, a broader, more comprehensive and more complete picture of the organic universe than he has ever had.

A SUITOR FROM THE STARS, by Colin Craig, 175 pages, stiff cloth covers, size 4¼x7¼, published by Thomas & Evans, Baltimore, Md. Price $1.75.

A weird and exciting story of science fiction. A visitor from the central city of the universe comes to earth and assumes the body of a man in order to hunt a cosmic criminal who has run run off with his lady-love. Mr. Craig gives us a picture of a great cosmic universe of spirits, of which the earth is a small island used as a penal colony. Spirits who have disobeyed the universal Law of Harmony are made to assume the flesh and to expiate their crime by living as an earthling. We get a picture from Mr. Craig's exciting pages of a supreme intelligence who governs a world of spirit. The material world that we see is only a small manifestation of the Great Being's Power. This is the sort of book that one refuses to relinquish until he has perused the last page. He will gasp with excitement at the chase after a criminal, to rescue a lady, taking place over billions upon billions of miles through space. For lovers of science fiction, embodying the natural and supernatural, this book is highly recommended. Parenthetically we might say that the book is dedicated to "Hugo Gernsback, Author, Editor and Scientist."

KNOCK WOOD—Superstition Thru the Ages—by Dr. Daniel Deerforth, 200 pages, stiff cloth covers, size 5½x8, published by Brentano's, Inc., New York. Price $3.00.

As the sub-title indicates, this volume is a history of superstition and its effect on man's life. The book is not humorous; in fact the author is in dead earnest in showing how man's fears and phobias, which persist with him still, have shackled his intelligence, prevented his progress toward greater comfort and greater happiness. Using as his text the many common superstitions about rabbit's feet, horseshoes, ladders, etc., he goes on to the various delusions of the Middle Ages, with the significance attached to religious and mystical rites. He shows how they influenced and still influence our modern world. How Galileo burning at the stake were tributes to superstitions, and the sacrificing of lambs as well as human beings were attempts to appease an angry God. Throughout the book, therefore, is traced the path of man's intellectual development, breaking the chains of his hidden mystical fears. "Knock Wood," is an easy book to read.

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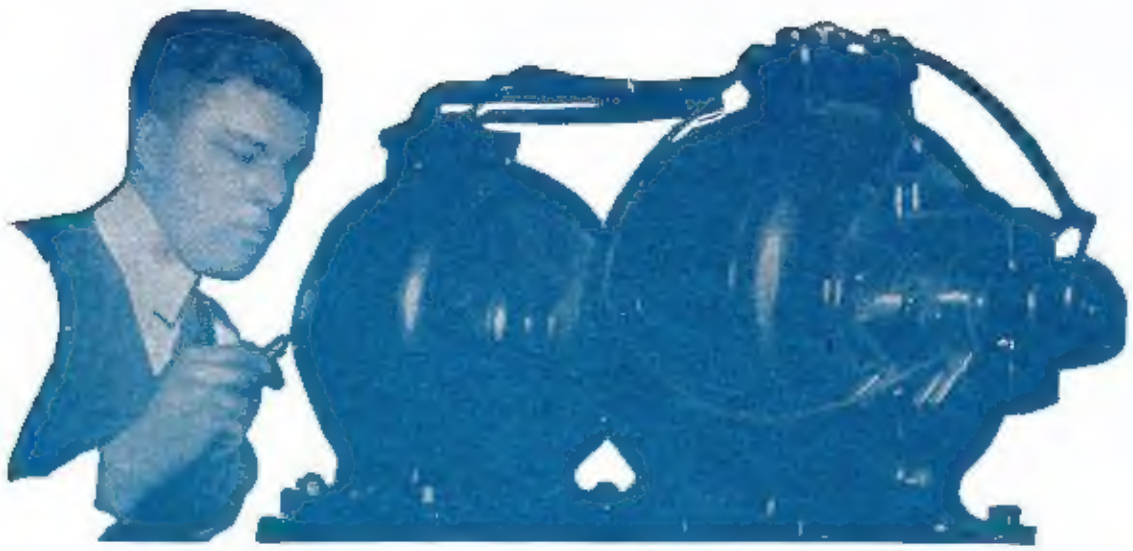

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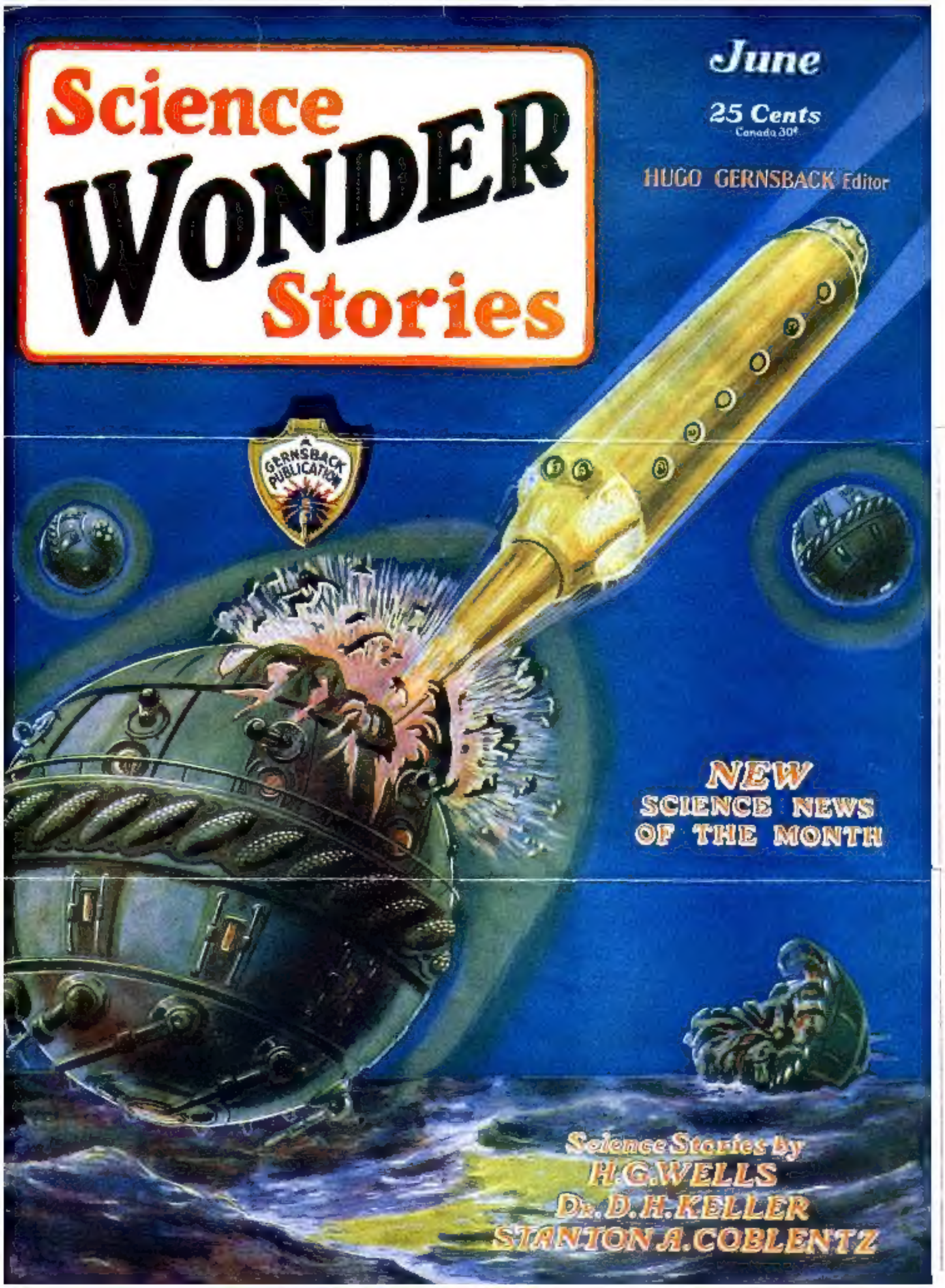

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